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Works of Art on Parchment and Paper

Interdisciplinary Approaches

Edited by: Nataša Golob & Jedert Vodopivec Tomažič

Ljubljana, 2019

WORKS OF ART ON PARCHMENT AND PAPER
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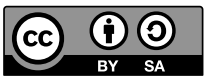

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WELCOME SPEECH

Dear distinguished guests, dear professors, dear colleagues and students, welcome to the Faculty of Arts, University of Ljubljana, and welcome to the international symposium "Works of art on parchment and paper"!

The Roman poet Horace said that pictures are like poems without words; we can all enjoy them, but it takes a person of knowledge, an artistic soul, to preserve, restore, and interpret them.

These wordless poems, these historical monuments, these works of art are part of our cultural heritage. They are the basis of who we are, the core of our identity, and a cultural reference that shapes our everyday lives. Without the knowledge of how to preserve works of art – not only on parchment and paper, which is the focus of this international gathering – but art in general, part of our history and our humanity is lost forever. Just think of the desperate elderly lady Cecilia Giménez from Spain – a few years ago she was the joke of the summer on social media. She was upset at the worsening state of the image of Jesus in her local church, so she took it upon herself to restore the artwork from the 19th century to its former glory, but with devastating results: The "Ecce Homo", a depiction of Christ crowned with thorns, now looks more like an ape than a man. She became an overnight sensation, but for all the wrong reasons. However, what is even more devastating is the deliberate destruction of our cultural heritage and works of art by radical paramilitary groups, such as the Islamic State, because of political and religious reasons.

The only way to resist these horrific processes and to tear down the walls between cultures and people that the Trumps of today are trying to build is by knowledge and by remembering the past in order to understand the present and the future. It is for these reasons that I am delighted that the international symposium "Works of art on parchment and paper" is taking place at the Faculty of Arts, which is the central educational institution in Slovenia for the humanities and social sciences. The role of the humanities in the 21st century is not only in preserving cultural heritage and providing the foundation for knowledge about the past; their role is also in discovering, unveiling, clarifying and connecting with the worlds that are foreign, different, perhaps frightening ... We cannot live our lives to the fullest if we are not familiar with the stories of foreign people and foreign cultures.

This is also one of the most important messages of the European Year of Cultural Heritage. It aims at encouraging "more people to discover and engage with cultural heritage and, to reinforce a sense of belonging, to enable people to become closer to and more involved with their cultural heritage", which "is not only found in literature, art and objects, but also in the crafts

we learn from our ancestors, the stories we tell our children, the food we enjoy in company and the films we watch and recognize ourselves in."[1]

I would like to welcome you to the Faculty of Arts during this special year, in which we are celebrating our centennial – 100 years of the University of Ljubljana as well as the Faculty of Arts as one of its founding members. In fact, the history and the story of the University of Ljubljana started with the first lecture in the Slovenian language at this very faculty, the Faculty of Arts, on December 3, 1919.

Our program of celebrating the centennial is quite ambitious. We have decided to organize 100 events to celebrate our anniversary. I know – perhaps we have gone a bit too far, but we will reach our goal, and I am pleased that this international gathering will be a significant contribution to this goal. I would like to express my gratitude to my colleagues for organizing this important symposium, and particularly to Professor Nataša Golob – without her striking energy, patience, and determination, this symposium would not have been possible. I would also like to thank the Archives of the Republic of Slovenia for their excellent collaboration and for co-organizing this event. I wish you all a thought-provoking conference and a pleasant visit to the Faculty of Arts in Ljubljana. Thank you very much.

Prof. Roman Kuhar, Dean
Faculty of Arts, University of Ljubljana

1 See: The European Year of Cultural Heritage 2018, https://europa.eu/cultural-heritage/about_en (June 1, 2019).

FOREWORD

The Archives of the Republic of Slovenia is Slovenia's largest and central state archival institution and is, as such, one of the most significant custodians of Slovenian written cultural heritage. Although primarily a keeper of millions of different written documents from the previous millennium, the Archives of the Republic of Slovenia is also proud to hold some of the items that fit into the broader definition of works of art on parchment and paper. It is perhaps because of this that it seemed self-evident for the Archives to co-organize the international symposium "Works of Art on Parchment and Paper", which took place between June 6 and 8, 2019 at the Faculty of Arts of the University of Ljubljana.

The symposium was excellently organized and rich and diverse in content. Words, faces, and memories fade away, but a book remains. If we review the titles of the published studies, we can see in the present publication a lasting reflection of a distinctly interdisciplinary scientific meeting. The book before us addresses experts, who, although coming from many different areas of work, still share a common interest in their concern for the well-being of cultural heritage and its research. Each from his own perspective, the authors manage to successfully shed light on the dynamic processes of the creation, preservation (conservation and restoration), and presentation of works of art on parchment and paper.

I believe that continual interaction and collaboration between the academic sphere and that of cultural heritage preservation is necessary and useful. It is this endless cycle of mutual encouragement and conceptual enrichment that enhances the quality of our cultural space. We often say that this space is rather small and that we basically all know each other. However, people only truly come to know one another when they collaborate. The project "Works of Art on Parchment and Paper" is the product of an exemplary collaboration between the Faculty of Arts and the Archives of the Republic of Slovenia.

I wish to express my sincere thanks to everyone involved in the organization of the symposium and especially in the compilation of the present publication. First, I would like to thank the Faculty of Arts and all its "subsystems" for their excellent cooperation and its dean, Prof. Roman Kuhar, for his dedicated support. Sincere thanks go to all of the authors of the contributions, members of scientific and organizing committee, peer reviewers, and colleagues at the Ljubljana University Press, Faculty of Arts. Finally, I wish to thank the two primary organizers of the symposium and the editors of the present volume, Prof. Jedert Vodopivec Tomažič from the Archives of the Republic of Slovenia and Professor Emerita Nataša Golob, who was a tireless *spiritus agens* of the entire project. Let me also take

this opportunity to congratulate the Faculty of Arts of the University of Ljubljana on its 100th anniversary. My wish is that this book finds a great number of attentive and supportive readers.

Dr Bojan Cvelfar
Director of the Archives
of the Republic of Slovenia

WORKS OF ART ON PARCHMENT AND PAPER ON OUR MIND

When preparing the international symposium "Works of Art on Parchment and Paper" in the spring of 2018, our plans coincided with those of the European Year of Cultural Heritage: we set out to present the research work and the never-forgotten concern for artworks created on parchment and paper – two of the historically most important and most frequently used media. Our invitation to participate in the symposium was accepted by many scientists, experts in this field of work, from various countries extending from the Baltics to Central America. In 2019, the year of the symposium and the presentation of this publication, the University of Ljubljana is celebrating its centenary, which for us marks an extraordinary jubilee; in this period, we formed the Slovenian scientific language, sharpened our views, and contributed to joint scientific progress.

When deciding on the range of the contents of the international symposium "Works of Art on Parchment and Paper", we focused on the experiences and the ideas exchanged over the years with our colleagues from around the world; we were also guided by our deep conviction that works on parchment and paper are a direct creation of the human spirit, and as such require special care and sensitive attention to their preservation, and, of course, detailed analysis of their imagery. Since ancient times, artists have been engaged in a dialogue with their readers and viewers through their works, whose imagery is always unique due to the artists' application of different shapes, colours, and materials. We are suddenly faced with the challenge of having to play two roles; on the one hand, we are viewers of these artistic items preserved from bygone times and different environments, and, on the other, we are their custodians; we also accepted the task of caring for the well-being of these precious artefacts from generations past – if only we knew the names of the persons that cared for the restoration and preservation of these works in libraries from Ancient Greece onwards, at least as well as we know the names of the authors of these works of art! As we reach towards them, we come to unveil and understand this ancient tradition more and more: in our concern for the preservation of intellectual creations and material properties of these achievements, these works tell us stories of conditions and environments specific to a particular time, place, and purpose of the work process.

The goal of our scientific meeting is to thematically present the latest research findings in this field of work, derived from many, often quite different, circumstances. The basic idea connected to the essence of these two carriers of painted and written records revealed an extensive range of material properties, which was expected. Although at all times retaining the characteristics of

its animal origin, parchment as a material was always produced in a slightly different manner, causing it to behave unpredictably and to age in unforeseeable ways. Paper is similarly anything but an unambiguous and straightforward medium; despite its widespread presence, throughout the centuries paper was made from different raw materials and, as such, was of various qualities. Artists used whatever they needed or had a chance to obtain. Thus, the aim of any researcher of aesthetic and thematic messages of such works of art, as well as that of researchers of the material nature of a particular monument and of conservators alike is to identify the entire spectrum of materials and media used, of writing instruments, colourants, etc. It is at this point that experts from the humanities and the natural sciences had to join forces to study the chosen cultural monuments closely. Since the profession of conservation-restoration and its principles play an essential part in our effort to preserve cultural monuments, the research findings and their dissemination presented here provide much-needed support in the planning of our future interventions.

This, however, is only one of the goals we set out to achieve. Since each work of art is an independent and unique creation, there were no dilemmas about which items to discuss and assess. We expected to see presentations of hitherto unknown or less-known works of art, and that is precisely what happened. We are therefore particularly pleased that, by publishing the studies, we are able to spread the word about their uniqueness and their cultural and artistic character. Works of art on parchment and paper are an eloquent and never fully revealed document of our past, whose fundamental idea is to convey beauty and knowledge. Due to their essence, monuments created on parchment and paper may define or even transcend all letter-based and fine arts systems. They embody visualization of language when image and record integrally shape a message, or they acquire an exceptional, iconic value through circumstances and become multi-layered memorabilia.

History destined them to different fates; studies published here reveal damages done to works of art on paper and parchment; they discuss changes that were expected due to natural processes, as well as some that were unforeseen and unpleasant surprises; the researcher's insight sheds light on metamorphoses caused by all sorts of interventions, which eventually put a strain on the originals, making them change visually as well as content-wise. Those of us that usually deal with works of art on parchment and paper are art historians, historians, archivists, researchers of recorded messages, conservators, physicists and chemists, as well as all others who care about the preservation of such artefacts. Each published paper is in a way a case-study, concentrated on an art-work that in itself is one and unique but at the same time is also an individualized problem within a group of many similar artistic items and monuments that share a similar history and problematic present.

As lecturers at the symposium were only able to present short and abridged information about a specific topic, this publication of scientific studies provides a platform for a more detailed presentation of their scientific and research goals, their research methods, dilemmas, and results. Theme-oriented contributions also reflect on the social and historical responsibility of all those in charge of such works. However now the concern and the never-ending effort for the benefit of works of art on parchment and paper are openly expressed once more; it is a message conveyed by careful and diligent custodians of this heritage; it is a reminder on the part of the profession and its experts. We are all custodians of our joint past, and we wish that our voice be genuinely heard.

This collection of scientific studies offers the written words of individual authors, but, unfortunately, cannot capture and hold their live interpretation at the symposium. The difference also lies in the arrangement of the whole: while lectures at

the symposium were following the chronological order of the presented works of art, the published studies are divided into the four groups of issues they deal with and are marked, as such, by intermediate titles. We also benefited from several focused topics presented in the form of posters. Our collective decision was that their scientific contributions had to be presented and published as short papers.

The first group discusses how to view the records we have been entrusted with; how to approach presenting them to the public, how to read documents on conservation interventions performed by previous generations – years go by quickly, circumstances change and with them also the use of different materials, many of which can nowadays no longer be obtained. The realization about the correctness of our value standards means we must examine small, barely known archival collections and be aware that such records significantly complement famous collections of well-known and critical archival records.

The second group, on art history, includes analyses of the works of art on parchment and paper from the Romanesque period to the mid-20th century. It opens a variety of questions about the multi-layered lives of artworks, about some of the less frequent drawing and painting processes, about ingenious examples of repetition and also falsification of artistic elements, about technical ideas of painters, about unforeseen mistakes caused by inappropriate materials, and about iconographic and stylistic issues.

When faced with damaged artistic creations, conservators need to decide among various conservation approaches; the third group of papers discusses their weighing of the options. Working with large-format art, with a large number of items in a single collection, with essential creations whose material properties surpass our experience acquired thus far, with extraordinary damage – all this requires a wide range of knowledge, long-standing practices, and combining diverse information and experiences. However, regardless of the difficulties, the principle of an intervention: needing to benefit the artefact is – as we have heard or read over and over again – our priority.

Precise natural science measurements can "see" the structure of materials, they can analyse it, and the results of such measurement can serve as a direction in our further procedures by showing us work processes that existed in a specific time and place. This is a rich field constantly developed by innovative technical possibilities and materials: those who had the chance to test them shared their observations in their discussions.

Many of our colleagues from the Faculty of Arts and from the Archives of the Republic of Slovenia deserve credit for being so involved in the organization of the symposium and in the compilation of this publication of scientific papers. Their efforts to enable this meeting of old and new research colleagues so as to discuss topics that we have been pursuing for many years most certainly deserve our sincere gratitude. Thanks to these friends and colleagues from the Faculty of Arts and the Archives of the Republic of Slovenia the symposium ran smoothly. No task was too hard for them, and together we managed to create a pleasant atmosphere and contribute to the successful development of the symposium. They stood by our side at all times, offering sound advice and exceptional care, and ensuring that all work was done as well as possible. Also invaluable was the absolute commitment of Prof. Roman Kuhar, the Dean of the Faculty of Arts, and of the Director and Deputy Director of the Archives of the Republic of Slovenia, Dr Bojan Cvelfar and Dr Andrej Nared, who were at all times willing to come to our assistance. They agreed that their respective institutions carry the financial burden as well, also assisted by the Department of Art History at the initiative of the Department's Head, Prof. Katja Mahnič. Both institutions also provided funds for the publishing of the present volume and the experienced

team of the Ljubljana University Press, Faculty of Arts helped us out with the layout of the book.

Since the core of the event were works of art on parchment and paper, eminent cultural institutions in Ljubljana generously opened doors to their special collections: National and University Library, National Gallery, National Museum, Modern Gallery, Museum and Galleries of Ljubljana, with its special unit, the Plečnik House. Those were valuable and exceptional experiences.

Our thanks also go to the experts on the individual presented topics, who undertook the not-so-easy tasks of peer-reviewing: Outi Merisalo, Tine Germ, Michal Ďurovič, Patricia Engel, Doris Hess, Ute Henniges, and special thanks to Jasna Malešič for her expert advice.

Nataša Golob and
Jedert Vodopivec Tomažič

Martin Halata

THE DILEMMA OF THE FINE ADMINISTRATOR: THE ORIGINAL OR FACSIMILE

Zusammenfassung

Dieser Beitrag widmet sich der Ausstellungspraxis des Archivs der Prager Burg. Der Schwerpunkt liegt dabei auf dem Ausstellen der wertvollsten und wichtigsten Archivalien und zwar aus der Perspektive des Archivgutverwalters. Das Archiv der Prager Burg bildet seit den 1960er Jahren eine wertvolle Faksimilesammlung. Für Archivarinnen und Archivare ist dies ein wichtiger Anhaltspunkt, denn im Archiv der Prager Burg wird das Ausstellen von Originalen als ein unangemessenes Risiko angesehen. Im Jahre 1996 waren Archivarinnen und Archivare nach Beendung einer internationalen Ausstellung über Josip Plecnik auf der Prager Burg mit einer problematischen Situation konfrontiert. Die Ausstellung solcher Archivalien birgt immer mögliche Risiken mit sich. Sie hinterlässt unerwünschte Spuren bei der Materie (z. B. dauernd, vorübergehend, zunehmend). In der Tat befindet sich der Archivgutverwalter hier in einer schwierigen Situation – hinsichtlich des ethischen Zugangs nutzt der Autor dieses Beitrags den Begriff *„zuverlässiger Archivgutverwalter“*. Dieser stellt sich den dringlichen Fragen bezüglich des Schutzes „seiner“ Archivalien. Zu den Voraussetzungen für den Erhalt der gewonnenen Kompetenzen des Archivgutverwalters gehören vor allem seine gute Zusammenarbeit mit dem Konservator sowie seine aktive Fachtätigkeit. Allerdings wird der anspruchsvolle Archivgutverwalter in seiner Laufbahn mehrmals gefordert, die hochwertigen Originalarchivalien auszustellen, wenn dies im Gegensatz zu seiner fachlichen Aussage stehen und zu anderen als wissenschaftlichen und Bildungszwecken bestimmt ist. Diese Prozesse sind auch in der Geschichte des Archivs der Prager Burg zu belegen, das seit 1920 in einer politischen Organisationsstruktur eingebettet ist. Diese Abwägungsprozesse stellen in der Praxis immer wieder ein weiteres Dilemma für den Archivgutverwalter dar. Er muss jeweils spezielle Schutzmaßnahmen für die ausgestellten Archivalien entwickeln und berücksichtigen. Fraglich ist, wer die Entscheidung darüber anhand welcher Kriterien trifft. Basiert die Entscheidung letztlich auf Einzelinteressen oder wird sie in gewisser Weise mittels demokratischer Prinzipien getroffen? (Übersetzt v. Petra Ponzerová).

Keywords: exhibition, preservation, archival care, facsimiles, administrator and fine administrator

Outline

Since 1920, the Archives of Prague Castle (hereinafter referred to as the APC), one of the most specialized archives of the public archival network in the Czech Republic, have stored unique archival documents from the 6th century AD to 2013 in its repositories.[1] It is a small workplace – four professional archivists take care of approximately 2,000 line metres of extraordinary documents. Due to the exceptional wealth of the Prague Castle archival depositories, its professional administration, including exhibitions, is carried out by professional and independent archivists. On a personal level, the archivists of the Archives of Prague Castle are required to be ethical professionals whom we suggest calling *fine administrators.* An important prerequisite of their work is their professional profile: if fine administrators do not publish papers in professional journals, which *de facto* reflect their constant interest in the documents, they should keep in touch with the relevant trends in their field. [2] What are the general principles fine administrators can follow in looking after invaluable archival heritage? When exhibiting archival documents, or preserving them as cultural heritage, we follow the Beijing Code of Ethics for Archivists (1996), which states *that archivists should protect the integrity of the archival material and ensure that it will be reliable evidence of the past.* The idea that *museums that take care of collections should preserve them in the interests of society and its development* has also inspired the ICOM Code of Ethics for Museums.[3]

The binding standard for our work is the Archives Act (2004).[4] Archivists also follow the principles for exhibiting archival materials in the National Archives of the Czech Republic (2002), set as an obligatory standard for Czech archives in 2019.[5]

Every fine administrator of archival materials of the highest category (in the APC, such materials include manuscripts on parchment, plans, photographs from the 19th century, the so-called Habsburg official acts from the 18th and 19th centuries, and the files of the Office of the President of the Republic from the first three decades of its existence) is *pressured* to exhibit them. Czech professional literature has reflected this crucial question since the 1980s. Ladislav Kolařík, who wrote textbooks on museology in the 1980s and 1990s, notes that *originals should not be allowed to be exhibited; facsimiles enable the same experience as the original*. Kolařík also defined various types of facsimiles and their use.[6] In 1987, the journal *Archivní časopis* published a text by Denko Čumlivski, who summed up his experience stating that archival documents, originals (etc.) *should be exhibited as additional, often just supplementary, quite marginal materials.* This statement is not inconsistent with Kolařík's statement about exhibiting facsimiles.[7]

Following this preventive procedure, however, fine administrators paradoxically find themselves in many dilemmatic

1 The APC manages 59 archive collections of various ranges from the 6th century to 2013. Its depositories also include the funds of the Metropolitan Chapter of St. Vitus Cathedral in Prague (6th–19th centuries) and the so-called Habsburg funds of the Prague Castle court offices (1526–1918). For the foundation of the APC, see: M. Halata, 'Archivní rozluka 1919-1925: Vznik a úkoly Archivu Pražského hrad', in: *Karel Kazbunda, kulturní dědictví a mezinárodní právo: Referáty z vědecké konference konané ve dnech 19.-20. dubna 2013 v Jičíně.* 2013 (Semily-Turnov-Jičín: Pekařova společnost Českého ráje v Turnově-SOA Semily, 2013), 264-293.

2 The fine administrators in the Archives of Prague Castle include graduate archivists, a historian, and an art historian.

3 'The Code of Ethics for Archivists', in: *Archivní časopis* 48, 1998 /1, 1-3. For the ICOM Code of Ethics for Museums, see: https://icom.museum/en/activities/standards-guidelines/code-of-ethics/, as museums can collect various kinds of archival materials.

4 The Act on Archiving and Filing Service and Amendments to Some Acts (Act no. 499/2004, Coll.)

5 M. Ďurovič, 'Zásady vystavování archiválií ve Státním ústředním archivu v Praze', in: *Archivní časopis* 1, (2003), 37-50. Zásady vystavování archiválií veřejných archivů České republiky, 2019, available at: https://www.mvcr.cz/zasady-vystavovani-archivalii-verejnych-archivu- ceske-republiky.aspx

6 L. Kolařík, *Restaurování písemných památek a tvorba faksimilií* (Prague: SNTL, 1991), 46-49.

7 D. Čumlivski, 'Poznámka k archivním výstavám', in: *Archivní časopis*, 3 (1987), 147.

situations and are exposed to very stressful or even neurotic moments. These are influenced by several factors:

1) General (esp. economic) rules of exhibition management: i.e., the pressure of exhibition institutions resulting from their competitive efforts to increase the attendance of exhibitions, the trend to hire the so-called *star curators,* often from other than „conservationist" disciplines, and their lobbying to exhibit unique „treasures" (which is a matter of personal prestige). Unlike fine administrators, these professionals do not deal with the material nature and physical condition of the documents, but with their iconography or contents.[8] Another factor is the ever-improving production of exhibition funds whose producers naturally have profit-seeking motives.
2) The conclusion of the APC into a political institution: this general aspect is also associated with specific institutional circumstances since the APC has been part of a political organization, the Office of the President of the Republic, since its establishment in April 1920. The APC is asked by the highest administration to use archival documents to accompany or present various political events or to represent its founder whose intentions are often different from the definitions of the codes of ethics.[9] These intentions are then realised by more or less aggressive political management and often characterized by *anxious haste* to implement their ideas. It is obvious that such a rush, based on the very nature of political work, is completely inconsistent with the reasonable speed and sequence of professional fine administration.
3) Crystallizing property relations to the most important archival collections, which is a consequence of the democratic development of the country after 1989. A special moment in the history of the APC was the deposit of ecclesiastic medieval archival materials and manuscripts of priceless historical value. Now, the interest of the deposit owner, the church, logically follows representational goals, often explained with the following words: *seized by the APC in the 1950s* (i.e., during the Czechoslovak totalitarian regime). The inadequacy of such a statement addressed to the current fine administrators is beyond dispute.[10]

Being a fine administrator

Fine administrators enter these relations with the conviction that archival documents are irreplaceable cultural treasures and they often form a *close attachment* to the documents during their daily work in the closely guarded depository, their *refuge*. However, the above-mentioned relationships are not the only factor the administrator has to mentally and intellectually cope with when asked to lend the document, especially when the facsimile is not accepted as a loaned object for various reasons, which seem *compelling* (summarized above under Points 1–3) to the interested party. Fine administrators are perfectly versed in the lending process, and they know their weaknesses. A human or technical error is, therefore, a depressing

8 J. Vnouček, 'Výstavy vzácných knižních fondů z hlediska ochrany a konzervace', in: *Problematika historických a vzácných knižních fondů Čech, Moravy a Slezska: počátky v dějinách knihtisku* (Sborník z 8. odborné konference; The proceedings of the 8th professional conference), Olomouc, 20-21 October 1999 / Brno: Sdružení knihoven České republiky and SVK in Olomouc, 1999), 97-107.

9 The first political exhibition at the Prague Castle was held in 1946, and the exhibition committee included active prominent politicians of the post-war period. The purpose of the exhibition was to present Prague Castle as the centre of a new democratic country, unlike wartime when Prague Castle – the seat of Czechoslovak presidents, Czech kings and Habsburg emperors – was occupied by the German administration of the Protectorate of Bohemia and Moravia.

10 The ecclesiastical deposit has been stored in the APC since the 1957s. In 2002–2019, the relations with its owner were covered in three agreements about storing the deposit in the APC. The agreements include the APC Principles for Exhibiting Archival Materials, based on the national standard of such principles. See note 4.

Fig. 1: Police surveillance during the transport of the so-called *Dražice Codex* to the North Moravian city of Ostrava (2018)

Fig. 2: Police surveillance during the transport of the so-called *Dražice Codex* to the North Moravian city of Ostrava – a stop at a petrol station (2018)

experience for them. Problems can occur at any time during the exhibition preparation, and include, for example, failure to comply with the terms and conditions of the loan, upon the receipt of the document, or during its installation and uninstallation.[11] Let us mention the curious experience of one of our administrators, which she had during the exhibition project *Ostrava nevídaná na cestě ke své velikosti (The Exceptional City of Ostrava on Its Way to Greatness, 2017)*.[12] The APC was asked to lend the so-called Dražický rukopis (Dražice manuscript)[13] that includes the oldest historical mention of Ostrava, the north Moravian metropolis. The exhibitor agreed to borrow the manuscript from the owner.[14] The manuscript, contractually insured for CZK 90 million[15] was transported to a local museum by a specialized company, two employees of the APC (and thanks to the Office of the President of the Republic police officers). (Fig. 1, Fig. 2)

Both the museum and the owner of the manuscript accepted the strict conditions of the loan set by the APC and based on a conservator's report (the showcase type, the exposure length, the quantity of illumination, the opening angle, especially exhibition stands). The manuscript was installed by an APC administrator who had previously worked in a restoration/conservation centre. During the installation of the archival document, however, the room was *suddenly crowded* with journalists with cameras who wanted to capture this unique moment for the local public. Not only did the administrator lose confidence in his demanding exhaustive installation work, but the relative humidity of the room started to rise rapidly due to the presence of many people. The administrator managed to install

11 Vnouček, note 8, 97-101.

12 Press releases are available at http://www.ostrmuz.cz/website/mainmenu/stranka-akcien/2017/750-let-ostravy/ostrava-stredneveka/

13 APC, KMK, Msc. G 5, 1st mid.15th century (*PRIMA PARS CRONICÆ BOHEM*)

14 The manuscript belongs to the church deposit of the APC, the fund of the Metropolitan Chapter of St. Vitus Library.

15 Ca. €3.6 million

the precious manuscript only after she vehemently protested this situation.

Fine administrators who deal with a psychologically challenging exhibition agenda have to fulfil demanding daily tasks, and after some time, they necessarily deal with a *personal intellectual dilemma*. The dilemma is related to their *professional self-reflection*: they realize they can lose their job if they do not give way to the *coercive political model of management* and do not agree with some loans, or they risk misunderstanding or professional isolation from the colleagues if they do not want to lend rare documents to them. This may make them think that their work is *the vanity of vanities*.[16]

The way out: a *preserving* care

What is the way out of these dangerous processes when we inevitably ask ourselves whether exhibitions of originals of invaluable documents are worth all the risk? Do exhibitions of originals meet the standards of archival care, which we propose to call *preserving care*? The APC has based its work on a single premise: *exhibitions of rare original documents represent a generally inadequate risk.* The APC has in its possession many facsimiles of a hand-made character (so-called "twins" – artistically crafted copies, technologically identical with originals) since the 1960s. Facsimiles began to emerge in 1966–1967, when the exhibition *Památník dějin československého lidu* (The Memorial of the History of the Czechoslovak People), gathering together copies of the most important documents of the Czech and Slovak state, was about to be prepared.[17] Eventually, the so-called mock-ups and high quality copies (after 2015), produced by graphic reproduction studios, were created as well. If there are high quality facsimiles, they are lent instead of originals, or a new facsimile is created. This practice is stated at the exhibitions. Making facsimiles and mock-ups, however, is financially very demanding and, under the current legislation, also lengthy; for these reasons, digital print reproduction on a scale of 1:1 and subsequent print on quality paper of the same colour and weight as the original is preferred, for example, for documents and iconographic materials (e.g., drawings, written documents).[18] This professional approach, which we suggest calling the *preservation mode*, however, may be seen as a kind of conservatory fundamentalism by the borrower and misunderstood or underestimated, which *may harm the reputation of the archives and increase interinstitutional animosity*.

The preconditions: cooperation and discussion are requested

Can fine administrators find a way out of this maze of relationships and risks? Based on our long-term experience, we conclude that the only solution is the close cooperation of fine administrators (archivists, archive curators) and conservators who sharpen their opinions in *mutual discussion*. Such co-operation is all the more effective if it is not clear whether an original document of the highest category should be exhibited considering its physical condition. Only a discussion between two professionals can

16 When working for the APC since 2000, I have seen two colleagues who could not bear the brunt of these relationships and decided to leave the job they had devoted a great part of their good professional career to.

17 V. Malá, *Moje roky v Archivu Pražského hradu*, 2019, 8: unpublished manuscript – Kolařík, note 6, 46. The facsimile collection of the Archives of Prague Castle was exhibited as a separate art exhibition at the bibliophile congress in Prague (1995) when its artistic value was highly appreciated. Cf. M. Kostílková, *Rukopisy Knihovny Metropolitní kapituly u sv. Víta.* Katalog výstavy faksimilií ve Starém královském paláci-Pražský hrad 25.-30.9.1995 = *Manuscripts of the Metropolitan Library of the St.Vitus Chapter.* <*Prague Castle - Old Royal Palace*>. Prague, 1995.

18 By 2000, facsimiles were incorporated into the registration system of the archive of the Czech Republic, the so-called National Archival Heritage, and treated as originals – archival documents; in 2010, they were removed from the registration system on the initiative of the APC to serve their real purpose.

lead to the successful conclusion that *the rarest documents can be exhibited under very stringent conditions* and after careful conservation preparation, as explained by Vnouček in his work.[19]

What are the preconditions of such a discussion?

1) Fine administrators should have sufficient communication skills to be able to act as equal partners of hired preservers/restorers. The APC hires an external preserver/restorer that also works as an adviser of the fine administrator and needs to have good communication skills to persuade the administrator to consider their opinion. The two professionals cannot be in dispute since their cooperation would not work and lead to a common result.
2) An ideal precondition for the discussion is *long-term cooperation* of the two professionals, the fine administrator and preserver/restorer, during which they can reconcile their positions and educate each other. There are many ways of cooperation. For example, when the APC dealt with the collections of medieval manuscripts, after the physical condition of the collection was examined, a continuously updated, structured database was created.[20] The database can be ideally accompanied by a printed version on archival quality paper (ISO 11108) and continuously stored in the registry of the department to be available to *future* administrators.
3) An essential part of the fine administration of archival funds is a functioning digital photo library, which is continuously updated based on researchers' requirements and includes both the images taken during the surveys of the physical condition of archival documents and the so-called study images taken usually by the fund administrators.[21]

Preconditions of a valuable discussion between the fine administrator and restorer are also shaped by the institution where the archival documents are stored:

1) Its employees should intensively explain the purpose of exhibiting faithful facsimiles ("originals for originals")[22] and any types of copies instead of the originals.[23] Education seems to be a very effective way to reduce any adverse events associated with exhibiting rare originals.
2) *Controlled excursions to archival departments*, co-organized by archivists, conservators and restorers, are a very effective way of raising awareness of the function and exhibition of original documents. We should emphasize that the *administration* of rare documents, paid by public resources, *does not take place in exhibition halls* but in air-conditioned and strictly guarded depositories where they can be kept for future generations. The Czech archive network has not reflected the necessity of being an educational and popularizing institution for the *majority* yet.

19 Cf. note 7. Recently, such an approach has been used, for example, in the exhibition in the National Museum of Ljubljana, where manuscripts and prints from the Maribor collections were exhibited under the conservation supervision of the Archives of the Republic of Slovenia (Arhiv Republike Slovenije). The exhibition also met educational requirements with its accompanying catalogue. Cf. the accompanying print N. Golob, *Na pergamentu in papirju: Rokopisi in tiski iz mariborskih zbirk,* <Ljubljana, Narodni muzej Slovenije, 5.12.2017 – 7. 2. 2018>.

20 J. Vnouček – M. Suchý, 'Průzkum fyzického stavu rukopisů fondu Knihovny MK u sv. Víta: konservátorská databáze jako předpoklad správy rukopisné sbírky', in: *XII. seminář restaurátorů a historiků*, Třeboň 2006, 240-249. – See also J. Vnouček –M. Suchý, 'Conservation database as a precondition for the administration of the manuscript library stored in the Prague Castle Archives', in: M. J. Driscoll - M. Ragnheidur (eds.), *Care and Conservation of Manuscripts 11: Proceedings of the eleventh international seminar held at the University of Copenhagen 24th-25th April 2008* (Copenhagen: Museum Tusculanum Press, 2009), 89-213.

21 M. Halata – M. Suchý, 'Fototéka Archivu Pražského hradu (situace v letech 2001-2008)', in: *Archivní časopis*. Prague 2009, 59 (1), 55-59.

22 The phrase was used according to R. Slovik, *Originál za originál. Zhotovení faksimile řezané knižní vazby*, 2016, available at:http://www.artefakt.cz/a%20sborniky%20z%20konference.html#2016

23 Slovik, note 22.

Fig.3: Excursion to the depository of the Archives of Prague Castle (autumn 2018)

To explain the meaning of archival storage means to explain how economically and technically challenging it is to keep the cultural heritage alive *and* how tricky it is to confuse this goal with the effect of an ephemeral exhibition (Fig. 3).

3) An ideal solution for exhibiting originals seems to be having *exhibition spaces* in archives where curators work as professional experts. As an example, I can mention the National Archives in Prague that has exhibited many rare archival documents under strict conditions in its exhibition hall. However, since it is impossible to build an exhibition hall for the APC, the institution has recently begun to entertain the idea of creating a partial *specialized fund (with air conditioning and showcases)* to present original documents, which would enable the APC to exhibit rare archival documents under the supervision of experts and the local team for a specific purpose and for a short time.
4) Natalija Glažar notes that the educational role of archives today does not represent a new aspect of their work; the new aspect is rather cultural marketing that meets the needs of the user archive public.[24] From this perspective, PR presentations of short-term exhibitions of rare documents are extremely important. An example of such a strategy in the Czech Republic was a successful campaign of the National Library in Prague, which exhibited the most famous Czech book, the *Codex Vyssegradensis* of 1086, between 31 January and 1 February 2015. The manuscript was exhibited in the Klementinum Mirror Chapel after nearly fifty years. The exhibition was open for two weekend days, and it was preceded by a massive press campaign that emphasized the *momentariness* of the exhibition, the *free* admission and the financial and historical *value of the document*, described the extraordinary *security measures*, and *presented the facsimile* of the rare Codex. While visitors queued in front of the exhibition hall for the whole weekend (Fig.

24 See N. Glažar, *Organizacijsko komuniciranje arhivov – hraniteljev arhivskega gradiva* (Ljubljana, Arhiv Republike Slovenije, 2002), 155.

Fig. 4: A queue of visitors waiting to see the *Codex Vyssegradensis* (2015)

Fig. 5: The *Codex Vyssegradensis* in a showcase (2015)

4, Fig. 5), another exhibition presenting great exhibits, including many original manuscripts, had a very poor PR campaign.[25]

Conclusion: the potential threat

The dilemma of "the original or facsimile" has been the main thread of the work of fine administrators, and it can leave a permanent mark in their mind. Each institution has to decide what the position of *their* fine administrators is supposed to be and what support they will be provided, and how it will maintain and develop its exhibition strategy. The APC, for example, works on the assumption that any exhibition of rare original documents presents an inadequate risk. It can harm the document during the exhibition process, and the damage may be small, reversible or irreversible, accumulative or non-accumulative. The archives of Prague Castle faced such a situation in 1996, after the end of an important international exhibition of Jože Plečnik[26] at Prague Castle, when it was discovered that the previously restored tracing paper under 19 pieces of plans and drawings was subsequently damaged. Rusty spots, caused by the unpredictable contents of the microscopic iron and copper particles in the paper pulp, appeared on the material.[27] Due to such unpredictable consequences of exposing rare documents, we can agree with the claim of de Witte and de Passer that "in almost every case [...] this is a situation where the object loses its integrity, historical and financial value, and thus becomes a loss for our cultural heritage".[28] Similarly, Vnouček (exemplifying the exhibition of books) states that "it is really advisable to see any exhibition as a potential threat".[29]

However, professional issues and dilemmas associated with exhibitions do not relieve the fine administrator of pressures to

25 Press release of the National Library of 28 January 2015: Událost roku – Národní knihovna ČR vystaví nejcennější knihu. Available at: https://www.nkp.cz/soubory/ostatni/tz_kodexvysehradsky.pdf. (date: 31st July, 2019). – A very good and inspiring example of how to exhibit a rare monument, including its exploration and PR, is given by Melania Zanetti in this anthology. Cf. also M. Zanetti, 'From East to West: Study, conservation and exhibition of the Tabula *Chorographica Armenica* (17th c.)', in: *Works of Art on Parchment and Paper* (Ljubljana: Znanstvena založba Filozofske fakultete – Arhiv Republike Slovenije, 2019), 125-133.

26 Exhibition *Josip Plečnik – architektura pro novou demokracii, Pražský hrad 1996*

27 H. Paulusová, B. Bacílková, R. Straka, 'Informace o průzkumu poškození plánů Josipa Plečnika', in: *X. seminář restaurátorů a historiků: Referáty. Litomyšl 24.–27. září 1997* (Praha: Pobočka ČIS při Státním ústředním archivu v Praze, 1999), 95-97.

28 Verbatim by G. de Wille, 'De Zilveren Passer. Exhibition conservation: Luxury or necessity. A case study: manuscript exhibition conservation in Bruges', in: G. Fellows-Jensen – P. Springborg (eds.), *Care and conservation of manuscripts 9: Proceedings of the ninth international seminar held at the University of Copenhagen 14th-15th April 2005* (Copenhagen: Museum Tusculanum Press, 2006), 211.

29 Vnouček, note 8, p. 98.

exhibit priceless archival documents also for other than educational or scientific purposes. Paradoxically, this pressure can open a professional discussion between the fine administrator and the preserver and help them find a synergic or *de facto defensive position*, which may ultimately lead to a shift in the professions and stabilize the exhibition strategy. There is no doubt that such pressures represent a deficit of democracy and limit the expertise of every one of *us,* the participants of the Ljubljana conference.[30]

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30 The photographs are property of the National Library in Prague (Figs. 4, 5) and Lenka Kluková (Figs.1, 2) and Michal Šula (Fig. 3).I sincerely thank Ivan Kopáčik (the head of the studio of Restoration and Conservation of Paper, Bookbinding and Documents at the Faculty of Restoration, University of Pardubice) for consultations; to Lenka Kluková (archivist of the Archives of Prague Castle/Records and Archives Department of the Office of the President of the Republic) for sharing her experience; to Irena Maňáková (the spokeswoman of the National Library in Prague) that she kindly lent me the photographs of the *Codex Vyssegradensis* ; and all *fine administrators* and conservators/restorers I have cooperated with in my professional life for an inspiring debate. I wish to express my sincere thanks to Petra Ponzerová, who translated the abstract.

Patricia Engel, Matthew Collins, Sarah Fiddyment, Carla Soto, Matthew Teasdale, Jiři Vnoucek

OLD CONSERVATION MATERIALS AND METHODS ON PARCHMENT DOCUMENTS

Zusammenfassung

Materialinhärente Information wird immer stärker durch Philologen genutzt. Restaurierungsmittel- und –methoden verändern das Material von Handschriften etc., in der Absicht es zu stabilisieren und das Fortbestehen der Originale zu sichern. Hoch an der Zeit ist eine Untersuchung, ob und wie die im Material enthaltenen Informationen durch Restaurierungen verunklärt oder sogar unlesbar gemacht werden. Der Beitrag nimmt diese Frage an Hand von Pergamentuntersuchungen mittels Restaurierungsverfahren von O. Wächter und modernsten MALDI TOF Untersuchungen im Zuge einer interdisziplinären Forschung in Angriff.

Keywords: old conservation methods, parchment conservation, information kept in the material

Introduction

The impact of conservation methods on cultural heritage items is a topic that has recently been understood as important and, therefore, was suggested as a new research area at the American Institute of Conservation (AIC) meeting[1] in Houston in 2018. For the particular field of paper conservation, a survey of what was considered the most relevant literature of the past years has been published by Zervos.[2]

However, the publication only covers a part of its intended field. It avoids any mention of changes in philosophical and theoretical approaches of the profession[3] and does not attempt a survey of the cultural heritage item in its entirety,[4] because Zervos only focuses on paper as a carrier of text. The author will present a new survey taking the conservator's perspective at the MATCONS 8–12 Oct. 2019.[5]

Another shortcoming of the research thus far is that the obviously outdated

1 https://www.culturalheritage.org/events/annual-meeting (June 2018)

2 S. Zervos, I. Alexopoulou, I. (2015), 'Paper conservation methods: a literature review', in: *Cellulose*, 22 (5), 2859-2897.

3 An overview is provided in: H. Riedl, P. Engel, 'Systems, patterns and fractals – Both decay and conservation in the Sisyphusposition', in: *ERC Newsletter*, 2/2015, pp. 18-25, most important U. Schädler Saub, D. Jakobs, *ICOMOS Hefte Deutschland X*.

4 P. Engel, 'Books Convey not only Knowledge, but also Beauty', http://www.icininfo.net/index.php?option=com_content&view=article&id=55&Itemid=59

5 P. Engel: 'Comprehensive criticism of conservation methods – their capacity to alter the material the documents, drawings and books are made of at MATCONS 2019'; https://www.muzeulolteniei.ro/en/api/article/view/id/cultural-agenda-c256

methods on conservation only rarely become a topic of research. The application of old methods, in contrast, has been altering the information conveyed by the very material of manuscripts over many decades; therefore, scholars, such as philologists who increasingly include the information carried by the material itself into their research, get misleading information.[6]

Finally, literature in languages other than English is hardly recognized at all in recent research in this field, although these instructions about how to preserve documents have influenced conservation activity over many decades and continue to do so.[7]

The team of the European Research Centre for Book and Paper Conservation-Restoration, therefore, strives to intensify the research into the topic of "fingerprints" of old and outdated conservation methods and the history of book and document conservation.

This contribution aims to be one piece in the whole mosaic and clarify the possible impact of old conservation methods on leather and parchment conservation results, using recipes brought together by Otto Wächter,[8] one of the pioneers in graphic art and book conservation, whose ideas have been taken up Europe-wide. A better study of his ideas, suggestions, and methods would clearly benefit the understanding of conservation-related findings in a large number of collections throughout Europe.[9]

Method

To demonstrate the above, the team of authors started out with the analysis of Otto Wächter's "*Restaurierung und Erhaltung von Büchern, Archivalien und Graphiken*", from 1982. The choice of the book was determined by two considerations: first, it was highly influential in its time, as said above; second, it is difficult to interpret if you were not a pupil of Wächter, and Engel was his pupil.

Wächter provides the recipes in a summary style, which makes it necessary to recall practical work with Wächter in the 1970s and 1980s in order to remember what was actually meant with the texts. In many cases, no concentrations are given for solutions and no description of how to apply a substance nor how long to let a substance react with, for example, a stain on the parchment is given.

As a first step, all the materials had to be brought together or had to be prepared.

There are several materials that are not available anymore, of which natural sperm oil is the most significant for our research. Hunting sperm whales is now prohibited and, therefore, fresh natural sperm oil can no longer be procured.

In some cases, the application could be simulated without recreating the damage that should be treated with the individual substance and method; in other cases, the re-creation of the problem had to be the first step, and the application of the conservation method was the second step. The decision as to whether or not the damage had to be recreated was based upon the question whether or not a research question, such as, "Did the conservation method and material alter the parchment in its internal information?", could be answered without the re-creation or only by re-creating the damage. The latter was the case, for example, when the period of the reaction of the substance with the parchment was dictated by the success of the result.

Both the conservation material and method and the re-creation of damage have been documented.[10]

6 Projects by Prof. H. Miklas University Vienna would be examples https://cima.or.at/heinz-miklas/ (19th July 2019)

7 O. Wächter, Schweidler, W. Wächter, Trobas would be important sources in the German language.

8 O. Wächter, *Restaurierung und Erhaltung von Büchern, Archivalien und Graphiken,* (Graz: Böhlau, 1982).

9 The contribution became possible due to the fact that Engel was invited to cooperate with Prof. Matthew Collins and his team, who recently won an ERC advanced grant https://sites.google.com/palaeome.org/ercb2c/home

10 Please see Table 1 for details.

Table 1: Table of recipes

Running Number	Sample preparation	Recipe as it was executed on the samples	The purpose	Observations	Hypothesis
1	An iron gall ink made after the recipe by Boltz von Ruffach* was applied to the parchment on both sides with a stick at around 18 °C room temperature and then the ink dried naturally.	**Sodium hydrogen carbonate solution** (10% in water) was applied onto the ink line with a glass pipette. Barium hydroxide was not used as I was not able to obtain it at a reasonable price.	Preventing ink corrosion.		Water might lower the shrinkage temperature.
2		Parchment A was rubbed with eraser powder a **Factis mix** (still old material from the 1980s, "Archival Aids Draft Clean Powder DCP32lb" by Ademco Limited) in a gentle way on both sides and then the powder was brushed off as we did in those days.	Dry cleaning.		Factis crumbs will stay in the parchment structure by electrostatic forces and age slowly, giving the parchment an overall yellowish hue.
3		**Water/70% ethanol 1:1 Vol %** was mixed at room temperature. The parchment was immersed and massaged for 2 minutes with a brush. Then parchment A was taken out and placed on oil paper,** and weights were placed along the margins of the piece.	Wet cleaning.		The shrinkage temperature will be lowered.
4	Parchment A was artificially aged for 60 days at a fluctuating temperature between 18 and 35 °C and a fluctuating humidity between 55 and 10 % rel Hum. Altering every 12 hours.	**Humidification chamber**: cold water mist was produced by natural evaporation of water from a basin for 2 hours, aged parchment was placed over the bowl with cold tap water for 2 hours. Thereafter, light pressing.	Softening.		The shrinkage temperature will be lowered.
5	Parchment treated like recipe 4.	I applied **glycerine** with my hands.	Softening.		The shrinkage temperature will be lowered.
6	Old parchment glue with vinegar.	The glue was sent as a liquid, and **parchment glue** was applied to parchment A by brushing with a brush.	Softening.		Alteration of information concerning animal.
7	Preparation of parchment glue: leftovers of parchment (animal not specified) are cut into small pieces, cold water is added 3-4 times, and they are left to swell at least overnight (10 hours). Then cooked in water bath for 24 hours. Put cardboard strips between the 2 pots; the solution should not become hotter than 70°C; ideal temperature is 50°C. the water that evaporates must be substituted by new water constantly, sift through a cloth, add vinegar of 7% 1/3 of the amount of the glue, add 1/3 of the amount alcohol, shake.	**Parchment glue** was applied to parchment A with a brush.	Softening.		Alteration of information concerning animal.

* Valentin Boltz „Von Dinten", *Illuminierbuch. Wie man allerlei Farben bereiten, mischen und auftragen soll. Allen jungen angehenden Malern und Illuministen nützlich und förderlich*, 1549. Reprint with introduction and indices ed. by J. Benziger (Nendeln: Sändig, 1976).

** Oil paper was kindly given by the archives of the Technical University Vienna.

Running Number	Sample preparation	Recipe as it was executed on the samples	The purpose	Observations	Hypothesis
8a/b	Parchment A was touched with vegetable cooking-oil on two spots, one closer to the "A" mark and one further.	The stain closer to the mark was treated with **magnesia oxide** and the farther one with **sepiolite**. **Benzine** was mixed with MgO and sepiolite each separately and applied onto the stain from the top. The poultice was left to dry at room temperature. Then the poultice was removed with a dry brush. The measure was repeated twice, then the stain was gone.	Removing grease stain.		Residues of the powders that might alter the information of the original treatment of the parchment with inorganic powder (calcium carbonate, etc.) Information om the source of the powder might be irritated or made impossible.
9a/b	Parchment A was touched with vegetable cooking oil to create two stains.	For the **ether** application, the areas of the 2 stains were put onto sepiolite and MgO, and the ether was dripped onto the stain from the top.	Removing grease stain.		As 8/ab.
10a/b	Parchment A was touched with vegetable cooking oil to create two stains.	For the **chloroform** application, areas with the 2 stains were put onto sepiolite and MgO and the chloroform was dripped onto the stain from the top.	Removing grease stain.	The chloroform did not stay in the area where I applied it, but ran all over the parchment sample 10a/b.	As 8a/b.
11	My blood was applied onto a parchment B to both sides and dried for 7 days.	Half of the stain was made wet with tap water from one side and put upside down over the open bottle of 30% $\mathbf{H_2O_2}$ for one hour at around 18 °C.	Removing blood stain.		Lowering shrinkage temperature.
12	Ballpoint pen lines were put onto parchment.	**Dimethylformamide** was dripped onto the area and the lines were rubbed off with a cloth.	Removing ballpoint pen ink stain.		
13	Parchment aged.	Aged parchment A was immersed into **milk (supermarket 3.5% fat)** for 2 minutes massaged a bit and then air dried.	Softening.		Lowering shrinkage temperature, slight fat – tanning.
14	Parchment aged.	Aged parchment A was immersed into urea 10% for 2 minutes and then massaged a bit and then air-dried.	Softening	The parchment became really stiff and not at all soft.	Lowering shrinkage temperature.
15	Parchment was aged.	Aged parchment A was immersed into **cedar oil** for 2 minutes and then massaged a bit and then air-dried.	Softening.		Slight oil-tanning.
16		Parchment A was dipped into **dimethyl sulfoxide**.***	Removing stain.		
17		Parchment A was dipped into **ammonia**.	Removing stain.		

*** The authors thank Ralf Witting for helping with some of the solvents needed.

Running Number	Sample preparation	Recipe as it was executed on the samples	The purpose	Observations	Hypothesis
18		Parchment A was dipped into a solution of **soluble nylon (from the 1980s) in toluene** (supersaturated solution).	Nylon was used as protection of colours.		
19		Parchment A was placed over the opening of a bottle holding 5 ml 30% **H_2O_2** and 3 drops of **ammonia** for 30 minutes.	Removing stain.		
20	Wheat starch paste was prepared of 1 vol part wheat starch and 4 vol parts tap water, boiled for 2 minutes and cooled to room temperature.	**Paste** was brushed onto parchment A flesh side.	Mending tears.		Lowering shrinkage temperature.
21	As in 20, but after the paste was cool, **Nipagin** was added to the paste before it was applied.	**Paste with Nipagin** was brushed onto parchment A flesh side.	Mending tears.		Lowering shrinkage temperature.
22		Parchment A was dipped into 5% **oxal acid** for one minute, taken out and dried at room temperature without rubbing.	Removing rust stains.	The parchment curled up while drying.	Shrinking.
23		Parchment A was immersed into 3% **HCl** for one minute, taken out and dried at room temperature without rubbing.	Removing rust stains.		
24		Parchment A was immersed into **Titriplex** 10% in water for one minute, taken out and dried at room temperature without rubbing.	Removing rust stains.		
25		Parchment A was immersed into a mixture of **H_2O_2 : ether** 1:1 Vol parts for one minute, taken out and dried at room temperature without rubbing.	Removing fly excrement.		
26		Parchment A was immersed into warm 10% **Borax** solution for 5 minutes, taken out and dried at room temperature without rubbing.	Removing milk stains.	When the parchment was dry the crystals were like shiny snow in winter light on the surface of the parchment.	
27		**Nitroverdünnung** (nitro-thinner is a mix of organic solvents such as ketones, esters and alcohols) was dropped over parchment A 3 times on both sides and then the parchment dried at room temperature.	Removing synthetic adhesives.		

Running Number	Sample preparation	Recipe as it was executed on the samples	The purpose	Observations	Hypothesis
28		Parchment A was immersed into **acetone** for one minute, taken out and dried at room temperature without rubbing.	Removing synthetic adhesives.		
29		**Hot water and turpentine soap**, parchment A was massaged for one minute with turpentine soap foam made with a brush first dipped into hot tap water and then moved over the turpentine soap. After the treatment, the soap was washed off the parchment with warm water and the sample left to air dry at room temperature.	Cleaning off ink stains.		Lowering of shrinkage temperature.
30	Fish bladder was soaked in cold water overnight and warmed in a water bath the next day over several hours. The fish bladder was from an old source in the USSR.	A small brush was dipped into the isinglass, and the glue was brushed onto the parchment A, after this the sample was left to dry at room temperature.	All sorts of gluing, like mending tears, etc.		Change of information about animal and lowering shrinkage temperature.
31	Parchment leftovers were soaked in cold tap water for 2 days and then warmed in a water bath the next day over several hours.	A small brush was dipped into the glue, and the glue was brushed onto parchment A, then the sample was left drying at room temperature.	All sorts of gluing, like mending tears, etc.		Change of information about animal and lowering shrinkage temperature.
32	As in 31, but as a final step of the preparation of the glue, vinegar was added to the glue: 1/3 vol and ethanol 1/3 vol.	As in 31.	All sorts of gluing, like mending tears, etc.		Change of information about animal and lowering shrinkage temperature.
33	A spoonful of **parchment glue (Nr. 32**) was mixed with a brush full of quite stiff **Hydroxypropyl cellulose** (20% in water), 1:20 and stirred until it was disseminated, then a very small amount of **PVA** was added (1:40) and stirred in, the solution became whitish and finally 6 droplets of **toluene** were added and the solution split.	The "salad dressing" was brushed onto the parchment A sample and left to dry at room temperature.	The mix is meant to consolidate flaking paint layers.		Change of information about animal and lowering shrinkage temperature.
34	**Methylcellulose** from the 1980s was soaked in water and, after swelling, mixed with **PVA** (2 parts MC and 1 part PVA).	The mixture was applied onto the surface of the parchment A. Then the parchment was allowed to dry at room temperature.	To glue elements together.		Lowering shrinkage temperature.
35	Recipe 20 Recipe 32 **Paste** of wheat starch and **parchment glue** was mixed 1:1 vol % and then a bit of **Nipagin** was added.	The mixture was applied onto the surface of parchment A. Then the parchment was allowed to dry at room temperature.	To glue elements together.		Lowering shrinkage temperature.

All treatments were performed in the manner as close as possible to the manner and circumstances back in Wächter's days: all treatments were performed at around 18 °C and a relative humidity of around 50%.

The parchment was made in the Bucharest Leather Institute.[11] The data frame of the procedure of parchment making is given in Table 2. In any case, one skin was used to make all samples, and only in one case was another parchment used.

Table 2: Data frame of the procedure of parchment making

Soaking I:	600% water at 20°C Allowed to stay for 4 hours
Drain Fleshing: manual	
Washing:	400% water at 20°C, drain
Soaking II:	600% water at 20°C, drain 600% water at 20°C 4% salt 0.2–0.4% detergent 3–4 h stirring overnight
Drain	
Liming	400% water at 25°C 4% lime 4% salt 0.3% detergent pH 11.5-12
Post liming	600% float at 25°C 2% lime Allowed to stay for 48 h
Deliming	500% water at 30°C 1% ammonium sulphate Stirring for 40 min; allowed to stay overnight
Washing:	400–600% water at 20–25°C Stirring for 60 minutes, allowed to stay overnight
Rinsing and stretching	

Aged samples were used in the case the treatment was meant for softening. Ageing was done for 60 days with a fluctuating temperature between 10 and 35 °C and a fluctuating relative humidity between 55 and 15% changing every 12 hours, accordingly.

The conservation recommendations by Wächter concerning parchment fall into three main groups, i.e., cleaning or stain removal, softening of hard parchment and bringing elements together, like mending tears or reattaching off-flaking elements of colour, which means adhesion in the wider sense. There are a few other treatments, such as mitigating ink corrosion.

Hypothesis

In general, the hypothesis can be summarized as follows: Wächter's recipes suggest that we are in danger of altering the information we can extract from the material with today's' means and measurements, as the approach to conservation treatments has changed over time.

Specifically, we presume that all water containing applications (as in the recipes listed here) would lower the shrinkage temperature of the parchment, meaning the shrinkage temperature of the collagen fibres, a feature that equates to damaging or lowering the quality of the parchment (being, in a way, a starting point of damage) and is to be avoided in the course of a conservation treatment.[12]

An alteration of the information about the animal can be expected of all recipes that contain DNA themselves (6, 7, 30, 31, 32, 33[13]) and, therefore, add this to the parchment. Where the use of DNA-containing materials is unavoidable, it makes sense to use a form that is as distant as possible from the conservation target. Thus, it is sensible to avoid mammalian glues to repair cultural heritage objects made from mammalian tissues such as parchment; isinglass (fish collagen) is much less likely to obscure a genetic signal from a calfskin parchment than sheep or (worst of all) cattle gelatine. Conversely,

11 *INCDTP - Sucursala Institutul de Cercetari Pielarie Incaltaminte (ICPI); INCDTP - Division Leather and Footwear Research Institute (ICPI), 93, Ion Minulescu St., Sector 3, 031215, Bucharest, Romania.*

12 K. Mühlen Axelsson, D. Sommer, R. Larsen, 'Dimensional studies of specific microscopic fibre structures in deteriorated parchment before and during shrinkage', in: *Journal of Cultural Heritage* 13(2) · April 2012' https://www.researchgate.net/publication/251664963_Dimensional_studies_of_specific_microscopic_fibre_structures_in_deteriorated_parchment_before_and_during_shrinkage (June 2019).

13 Please see Table 1.

in order to conserve fish leather, it would be more sensible to use cattle or rabbit gelatine than isinglass.

The inorganic material to chalk the parchment in the course of its production can be potentially traced geochemically. The use of earth alkali metals in the conservation treatment can interfere with the information of the original material (8, 9, 10).[14]

Furthermore, the presence of Borax might be irritating (26).

A sort of fat tanning can be presumed in recipes 13 and 15.

The application of nylon is described in recipe 18 and the application of eraser powder[15] in recipe 2.

Furthermore, we should take into consideration that such finds would also influence our recent conservation decision-making and choice of conservation material and techniques. If water is a material which endangers parchment so severely, we should either avoid it or find alternative application techniques.

First results

This hypothesis was considered under a philosophical-ethical viewpoint and under a scientific viewpoint. This publication focuses on the latter.

The instrumental analysis should verify whether or not the information carried by the parchment was obscured and, if so, in what way. This would allow for a sort of retranslation of the information gained now into the information which was there originally. In an extreme case, the entire story of the survey of manuscripts by means of instrumental analysis might need to be rewritten.

Peptide mass fingerprinting (PMF) was performed using Matrix-Assisted Laser Desorption/Ionization - Time of Flight (MALDI-TOF) mass spectrometry (MS) to establish the species of animals used to make both the parchment and glue and to assess the level of damage (deamidation) present in the sample due to the manufacturing process.

To carry out the sampling, a previously developed method of the group was used, non-invasive sampling technique (eZooMS), based on triboelectric extraction involving the use of PVC erasers that allows us to interrogate parchment manuscripts without having to use more destructive samples.[16]

Initially, the use of MALDI-TOF mass spectrometry was chosen as it is fast, inexpensive and a useful basic identification tool or screening method. PMF is based on the analysis of one protein (in this case collagen) cut into smaller fragments (peptides) using an enzyme (in this case trypsin). The mass of these peptides measured using MALDI-TOF mass spectrometry creates a profile or "fingerprint" of the protein, which can then be compared to a reference database. With this method, it was possible to determine the species used to make the parchment and also any additional species used to make the glue that might have been applied to the surface.

Our preliminary results are as follows: All samples were identified as coming from goats. With this method, it is also possible to determine a general value of deamidation, a particular type of damage that occurs in the collagen molecule when the skin is exposed to hydrolytic chemical reagents (notably lime) during its production process, which is defined as the Parchment Quality Index (PQI). This is expressed as a percentage; a value of 100% corresponds to no deamidation, and therefore low or no exposure to lime, and a low value points to a more damaged molecule.

In this instance, in which samples were treated with glue, it was found that both the

14 Research into using dust as a source of information for dating and locating a work of art has recently been conducted by the author P. Engel and Th. Prohaska and his team at Montanuniversität Leoben.

15 Product name: Archival Aids Draft Clean Powder DCP3 2 lb can.

16 S. Fiddyment, B. Holsinger, C. Ruzzier, A. Devine, A. Binois, U. Albarella, R. Fischer et al. 2015. 'Animal Origin of 13th-Century Uterine Vellum Revealed Using Noninvasive Peptide Fingerprinting', in: *Proceedings of the National Academy of Sciences of the United States of America*, 112 (49), 15066–71.

parchment and glue are made of the same animal, and thus, it is much harder to determine where the damage is occurring (whether on the parchment as part of its production or from the glue) and will require further data analysis. It is hoped the information that was provided through our analysis will assist conservators in their decision-making and give us a greater understanding of the processes that affect parchment stability and deterioration.

Another suggestion in the conservators' hypothesis had been that the application of some of the products should lower the shrinkage temperature of the collagen. For that, the shrinkage temperature must be measured. This method is also accessible for conservators and is currently performed.

In the meantime, all samples were cut in half and artificially aged in one part; tests will also be run with these to simulate natural ageing.

To conclude: there is much work to be done to understand the way in which the 20th-century conservation methods might have altered the information kept in the material of our cultural heritage, of which only one material and one series of instructions has been discussed here.

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ARTWORKS ON PARCHMENT AND PAPER MATERIAL OF PARISH ARCHIVES IN THE DRAVOGRAD-MEŽA VALLEY DEANERIES

Zusammenfassung

Der Autor behandelt in seinem Beitrag die Arten des Archivmaterials der Pfarren im Mießtal, welche unter die bildenden Kunstwerke auf Papier und Pergament eingestuft werden können. Das dort erhaltene Bildarchiv teilt er auf Bauplänen, Bildern bzw. Postkarten der Kirchenobjekte, erhaltene Bildillustrationen, Andachtsbilder und kanonische Tafeln auf, sowie auf Bildnisse, unter welche er auch die einzige erhaltene Karikatur einordnet. Dabei stellt er die Archivalien, die aus jeder einzelnen Gruppe am repräsentativsten sind, etwas genauer vor.

Keywords: Meža valley, Carinthia, archive material, ecclesiastical history

Introduction

Systematic recording of archives of parishes on the territory of the deanery of the Dravograd-Meža Valley has revealed a great deal of archival material painted on paper and some on parchment. Most of this kind of archival material was discovered in the parish archives in Prevalje, which is also the largest in scope, as it contains as many as 105 archive boxes. Individual fragments of this kind of material are found in the parish archives in Kotlje, Ravne, Črneče and St. Daniel near Prevalje. Two examples of this kind of material are painted on parchment and leather, while the rest are painted on paper. The purpose of this article is to present these archival materials to the general professional public.

Development of Church administration

In the early Middle Ages, the Meža valley was part of the Aquileian patriarchate, which established an archidiaconate for the Carinthian region south of the Drava River, as a kind of intermediate stage between the arch parishes and the patriarchate. The territory of the Meža valley covered two more arch parishes: Šmihel near Pliberk/St. Michael ob Bleiburg, which covered the areas of the parishes of Črna, Mežica, Šentanel and Strojna, and the Šmartno near Slovenj Gradec, which included the parishes Kotlje, Guštanj (Prevalje and Ravne), Libeliče and Črneče. Until 1751, the parishes Prevalje, Libeliče, and Kotlje belonged to the Aquileian patriarchate. From this year onwards, until 1787, they were part of the newly established Gorizia Archbishopric. Unlike the aforementioned parishes, the parishes of Črna,

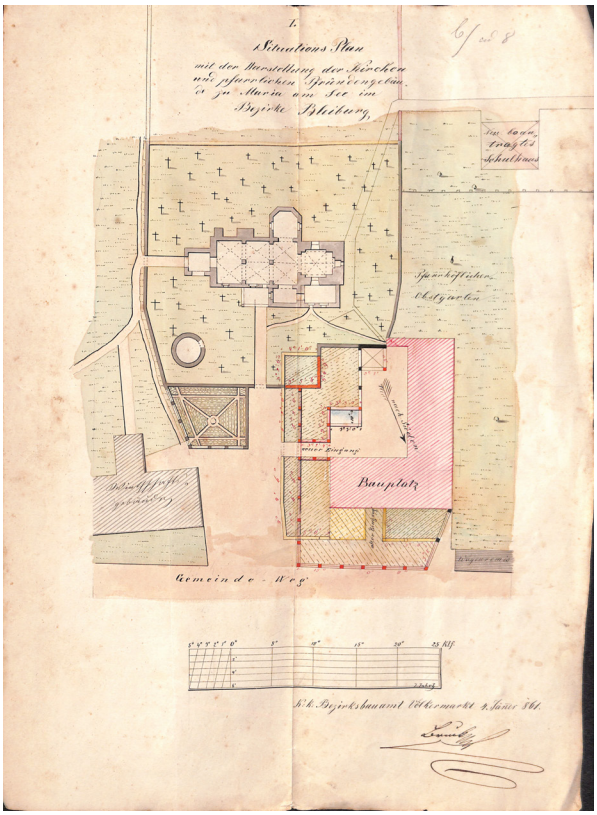

Fig. 1: Site plan of parish buildings in Prevalje, author: Bruck, 4. 1. 1861

Mežica, and Šentanel belonged from 1461 to 1787 to the Ljubljana diocese. That same year (1751), due to the regulation of the borders between the dioceses, all parishes in the area of the Meža valley were annexed to the Lavantine diocese. Between 1859 and 1964, they were part of the Gurk diocese. After 1964, they were again integrated into the Lavantine or Maribor diocese.[1]

Examples of archival material

The first set consists of colour plans from the 19th century, which were used in parishes for the renovation of buildings. Such plans were partially preserved in parish archives in Črneče, Prevalje, Ravne, and Šentanel. They include the plans of the rectories, commercial buildings, churches, and also plans for their reconstructions and renovations. Amongst them, the site plan of the parish buildings in Prevalje stands out (Fig. 1). It was drawn by the Völkermarkt's district architect Bruck on the 1st of January 1861, for the planned renovations of the rectory. Its distinct feature is that it depicts a Romanesque ossuary, which was demolished a few years later. From the artistic and historical point of view, the layout of the old parish church in Prevalje is equally significant, because the old church, with the exception of the bell tower, was demolished in 1890 when the construction of a new church began. From the said plan we find that the original Romanesque church in Prevalje was among the churches with an eastern bell tower above the presbytery, and its nave was divided by two columns into two parts. On the sides, two chapels were attached, whereby its layout in the Baroque period was shaped like a cross.[2]

The second set consists of artistic depictions of churches, for example, postcards and colour drawings on the A5 format and date back to the second half of the 19th century. This set is quite dispersed: such material can be found in parish archives in Šentanel, Kotlje, Ravne, Črneče, and Prevalje. One of the most striking pieces is the black-and-white drawing of the church of St. Barbara (in Zagrad, near Prevalje), drawn by F. Klemen in 1850. The special feature of the depiction is that the original Gothic bell tower is still present, which had risen above the presbytery and which was pulled down in 1908 and replaced by a neo-Gothic bell tower, which was added to the western wall of the nave. The second particular piece of art is a colour postcard of the Church of the Holy Cross near Dravograd from the second half of the 19th

1 V. Skitek, 'Oznanilne knjige župnij v 19. stoletju na območju jugovzhodne Koroške', in: *Obdobja 37, Starejši mediji slovenske književnosti: rokopisi in tiski* (Ljubljana: Znanstveni inštitut Filozofske fakultete, 2018), 55-64. V. Skitek, K. Oder, Prevalje skozi čas, in: *Žive vezi – Rastoča knjiga Koroške* (Ravne na Koroškem: Koroški pokrajinski muzej, 2015), 106; K. Oder, *Občina Ravne na Koroškem* (Ljubljana: Znanstveni inštitut Filozofske fakultete, 1992) 24-26. On the development of mediaeval Ecclesiastical history in Carinthia, see also : J. Höfler, *O prvih cerkvah na Slovenskem* (Ljubljana: Viharnik, 2017²).

2 S. Javornik, *Likovna dediščina cerkva Mežiške doline* (Ravne na Koroškem: Koroški muzej,2002), 46-49; Arhiv župnije Prevalje (AŽP), Načrti župnijskih objektov, škatla 94.

Fig. 2: Book (chronicle) of fraternity "Jesus, Marija, Jožef", Prevalje, 1688, photo: Aleksander Ocepek, 2019

Fig. 3: Book (chronicle) of the fraternity "St. Daniel", Šentanel near Prevalje, 1763, photo: Aleksander Ocepek, 2019

century. The unique feature of the postcard is that it depicts the church, which was consecrated in 1851, and the Makočnik farm. The farm was donated to the newly-built church by the farms' previous owners. The farm buildings were later demolished, and there is no trace of them today.[3]

The third set is represented by two fraternity books. The first book, from the parish archive in Prevalje, is of the Brotherhood of Jesus, Mary and Joseph, which was founded in 1688. On the paper pages, there is data on the establishment of the brotherhood, its members from the serf and bourgeois classes. This is followed by a parchment sheet decorated with coloured painted images of the Holy Family, or Jesus, Mary, and Joseph as the chief patrons of this brotherhood and the name of the brotherhood. This is followed by four further parchment sheets decorated with a large green bay leaf wreath bound with two red bows. On these sheets, all the members of the brotherhood, who were members of the noble families or priests, are recorded (Fig. 2).

The other fraternal book is from Šentanel and has a brown leather cover with a lavish colour image of the prophet Daniel in the lions' den; on the other side of the cover, the name of the brotherhood is written in golden-brown letters as is the year of its foundation: 1763 (Fig. 3). The interior of the book, which consists of bound paper sheets, is for the census of members of the brotherhood and their contributions. Both fraternal books were created due to the needs of both brotherhoods for keeping the list of members and recording revenue and expenditure. Their rich decorations,

3 Javornik, note 2, 33; AŽP (note 2), Risba cerkve sv. Barbare, škatla 94; Arhiv župnije Črneče, Dopisnice črneškemu župniku, škatla 8.

however, are external signs of their importance in domestic environments.[4]

The fourth set represents the religious images of saints and prayers. Two documents are presented in detail in this section. The first is a prayer plaque with the title *Sacerdos cum lavat manus dicat* originating most probably from the end of the 17th century and was used in the reading of Masses. It is rectangular and has a black base with a white border. On the black background, the image of the Baroque altar frame is depicted in which the text of the prayer is printed on a white background. The second is the image of St. Therese of the Child Jesus, most likely created at the beginning of the 20th century, and is the size of A6 paper. A holy card with a photo of the young nun St. Theresa is different in form because the central place on a rectangular image occupies the photograph of the saint, and her name, written in French. Its origin is linked to purely religious motives, or with the desire to expand the knowledge and the prayer to this young saint.[5]

In the end, the drawings of the Kotlje's parish priest Ludvik Lajnšček are added to the presented documents. On 28 January 1941, a caricature was drawn with a pencil by the famous Slovenian cartoonist Ladislav Kondor in Murska Sobota.[6]

Conclusion

Archival material, through its research, opens its eyes to the past. Graphic materials were often a supplement to written documents and therefore were not maintained to such an extent. It emerged from the need for building, by expressing the importance of institutions to the world, following religious devotion and the fundamental need for art, out of which humanity prospers. In such an invaluable way, in addition to data-based knowledge, graphic materials give us a visual image of people and objects that shaped our history decades and centuries ago.

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4 AŽP, Knjiga bratovščine Jezus, Marija, Jožef, škatla 11; Arhiv župnije sv. Danijel, Knjiga bratovščine sv. Danijela (urbar), 1763, škatla 11.

5 Arhiv župnije Ravne, Podobica/kanonska tabla »Sacerdos«, škatla 5; AŽP, Podobice, škatla 97.

6 Arhiv župnije Kotlje, Karikatura Ludvika Lajnščka, Ladislav Kondor, 28.1.1941, škatla 16.

Barbara Navala

PATTERNS OF DECORATION: QUIRE SIGNATURES AND INITIALS IN 12TH CENTURY CISTERCIAN LEGENDARY (ALC. 418-422) FROM ALCOBAÇA

Résumé

Le monastère portugais de Santa Maria de Alcobaça a été fondé en 1153 en tant que 53e affiliation à l'Abbaye cistercienne de Clairvaux. Il est partie prenante de l'activité intense de création artistique qui anime le Portugal du Moyen-Âge et constitue à cet époque un centre culturel important. Le monastère recelait une riche bibliothèque de manuscrits et nous pouvons dater du XIIe siècle pas moins de 24 manuscrits préservés. Un des manuscrits les plus intéressants de ce fonds est *Le Légendier* d'Alcobaça, Alc. 418-422, qui du point de vue stylistique reprend toutes les tendances esthétiques essentielles de la fin du XIIe siècle présentes à ce moment dans ce scriptorium. Le quatrième volume du *Légendier* contient les signatures uniques du corpus de manuscrits du XIIe siècle, signatures dont les ornements sont dans une relation stylistique et formelle étroite avec le reste de l'ornementation des manuscrits et qui constituent un témoignage important sur le travail méthodologique et la coopération dans le cadre du scriptorium d'Alcobaça.

Keywords: Illuminated Romanesque manuscripts, Cistercian Monastery Alcobaça, Legendary Alc. 418-422, initials, ornamented quire signatures

A few historical notes

The Portuguese Cistercian monastery Santa Maria de Alcobaça was founded in 1153 as the 53rd affiliation to the Clairvaux Abbey. It was founded at the outermost edge of the Christian territory that had only recently been reconquered from the Arabs, which helped create a new Portuguese political state. The foundation, therefore, had a significant ecclesiastical and political impact, as well as revitalising the economic and cultural life of the country. It is still not precisely clear what the political background was that led to the foundation of this Portuguese monastery, but several different hypotheses identify the involvement of Saint Bernard, and diplomatic mediation at the papal court has led many scholars to the presumption that the foundation of Alcobaça was part of a more ambitious ecclesiastical and political plan.[1]

At the time of its foundation, Alcobaça was a part of a vibrant artistic environment that spread from the north of Portugal to its

1 B. Navala, *Knjižno slikarstvo 12. stoletja v cistercijanskem samostanu Alcobaça* (unpublished doctoral thesis, University of Ljubljana, 2011), 22-27.

south. At almost the same time, cathedrals in Braga, Oporto, and Coimbra were being built, mixing foreign artistic influences, mainly from France, with the local Iberic Romanesque tradition.

Alcobaça's library during the 12th Century

Alcobaça's monastic library is nowadays considered one of the most splendid Cistercian libraries. Copying of manuscripts started in the second half of the 12th century and lasted until the 16th century, when a printing workshop was established in the monastery. Book production in Alcobaça was therefore continuous right up until the abolishment of the order in 1834. The first preserved catalogue of Alcobaça's library dates from 1775,[2] which is why we can now only reconstruct the original state of the medieval library by analysing the remaining manuscripts. Its later development and history can also only be outlined on the basis of different notations and historical documents that have been preserved. Of the 453 manuscripts that are today kept in the National Library of Portugal, we can date 24 manuscripts to the 12th century. Due to the lack of written documents and written sources, the dating is based on stylistic and formal analysis of the artistic decoration, analysis of material aspects of the manuscripts, palaeographical analysis, and on a few ex-libris and marginal notes.

Manuscript production in Alcobaça started shortly after the establishment of the monastery in 1153 and reached its creative peak at the time of the Abbot Martinus, who led the monastery between 1176 and 1191. In the colophon of the manuscript, Alc. 365 can be found a note that says that the manuscript was copied at the time of his abbacy.[3] The content of Alcobaça's medieval library is very similar to other Cistercian libraries of that time, but there are nevertheless some exceptions: there is a relatively large number of preserved liturgical manuscripts; there is a clear preference for Latin (and not Greek) church fathers; the library contained the natural history work *De Avibus* by Hugo de Folieto and a canon law collection by Burchard of Worms, which indicate the importance that Alcobaça will have in the coming years in the area of ecclesiastic and civil law.

There are six different liturgical manuscripts that can be dated to the 12th century, which in comparison with other Cistercian libraries is a relatively large number, considering that these kinds of manuscripts were in constant use during the liturgy or quickly replaced by new texts when new formal regulations changed the content of liturgical books.

The group of liturgical manuscripts in Alcobaça 12th century is thus formed by two *Lectionaries*, one *Psalter*, one *Collectar,* one *Martyrology* and the *Legendary*[4] in five volumes with current shelf number Alc. 418-422.

Legendary is one of the few of Alcobaça's manuscripts that contain an ex-libris (Fig. 1). At the end of the last volume, the scribe wrote: "*Liber S. Marie de Alcubacia*" and decorated the capital letters with filigree ornament. This is a very valuable piece of information that precisely determines the provenience or ownership of the manuscript and that it belongs to the original library of the 12th century.

As was common amongst the affiliated monasteries, the Alcobaça *Legendary* was copied from the Clairvaux "old" *Legendary*,[5] which was lent before it was replaced in 1170 by the new one. In this way, the manuscript arrived in Alcobaça in the last decades of the 12th century.

Although the similarities between both, especially regarding the wording and the content, are more than obvious, there are also some significant differences. In the

2 F. De Sa, *Index Codicum Bibliothecae Alcobatie* (Lisboa: Typographia Regia, 1775).

3 '*Et ego martinus eiusdem loci abbas dico et confirmo (...)*'. Lisboa, Biblioteca Nacional, Alc. 365, fol. 117r.

4 Lisbon, BN, Alc. 418-422.

5 F. Dolbeau, 'Le Légendrier d'Alcobaça. Histoire et Analise', in: *Analecta Bollandiana*, 102 (1984), 263-296.

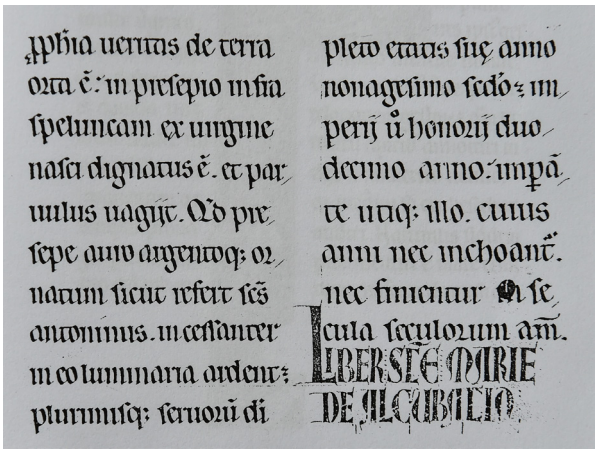

Fig. 1: Lisbon, Biblioteca Nacional de Portugal, *Legendary*, 5th volume, Alc. 422, fol. 251r[6]

table of contents in the first volume of the *Legendary*, we can read that the text also includes the legend *Vita S. Mauri abbatis,* but the notation is crossed and then on folio 232r can be read "*Quere in libro de uitis sanctorum partum*". This means that the *Legendary* was conceived as an individual work, but at the same time also as a part of an already existing monastic library, where the legend of the above-mentioned saint had already been copied elsewhere.[7]

It can also be observed that some other legends, mainly of local saints, were added as well. In the main text were among others also included *Historia Titi et Vespasiani* and the legend of Saint Vincent. [8] The latter was probably even copied in the scriptorium of the Lisbon's cathedral by the master called Stephanus.[9]

It is vital to note that two out of five volumes of the *Legendary* still possess their original bindings, which is quite surprising for such a large format manuscript and for its content, since the liturgical books were in constant use by the monastic community. Alc. 418 and Alc. 421 (that is the first and the fourth volume of the *Legendary*) possess their original bindings. According to the systematization of medieval Portuguese bindings, this is of the complete loop type (type B), which is the prevailing type of Alcobaça's medieval bindings, because (due to the routing of the straps) the manuscript is very solidly and very flexibly bound together. Because this technique is quite challenging and time-consuming, it was very soon replaced by another technique that was less firm, so the fragility of the manuscript was increased. In the scientific literature it is considered that the binding of the type complete loop is a slightly older binding technique and that its origins must be local, that is Iberic, and that other later techniques appear in Alcobaça mainly as a foreign, French influence.[10]

Initials and decorated quire signatures

The *Legendary* from Alcobaça is stylistically a mixture of different textual and stylistic solutions that follow the aesthetics of the late 12th century and late Romanesque illumination. The decoration of the manuscript is composed mainly by the initials; only Alc. 421 has ornamented quire signatures, which are unique to Alcobaça's book production in the 12th century.

The initials from the manuscript can be typologically divided into calligraphic, silhouette, and painted initials, while painted initials can be further divided into a group of initials with compact bodies and into initials formed by scrollwork. An interesting subgroup of these initials is leafy initials,[11] whose body is formed only by leaves. The leaves do not grow out of the tendrils, but appear to grow out of leaves themselves and thus present a totally novel arrangement. The formal Romanesque duality of the scrollwork body and leafy adornment is lost and no longer

6 Illustrations are copies of the microfilms, obtained from the National Library in Lisbon, Portugal.

7 M. A. Miranda, *A iluminura românica em Santa Cruz de Coimbra e Santa Maria de Alcobaça* (unpublished doctoral thesis, Universidade Nova de Lisboa, 1996), 276-280.

8 Miranda, note 7, 202.

9 Miranda, note 7, 200-202.

10 A. A. Nascimento, *Encadernação Portuguesa Medieval. Alcobaça* (Lisboa, 1984).

11 Navala, note 1, 92.

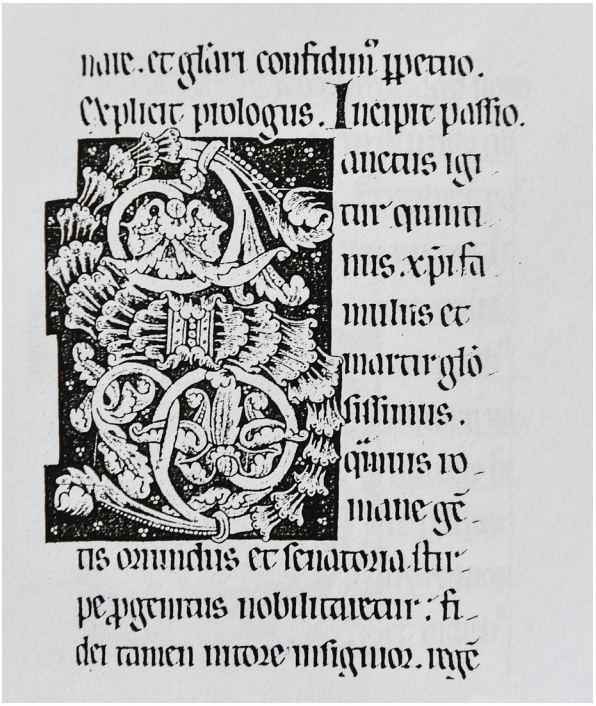

Fig. 2: Lisbon, Biblioteca Nacional de Portugal, *Legendary*, 4th volume, Alc. 421, fol. 93r

exists. Now the initials are formed only by leaves and other unusual elements that have no logical connection with the natural. It seems that such initials represent an endpoint in the Romanesque foliated scrollwork ornamentation.

Stylistic analysis of the Alcobaça's *Legendary* shows that the artistic elements of the manuscript were the work of several different masters of drawing and painting, who followed the same model, but were stylistically very different in the conception of their initials. The collaboration of several different artists at the copying and illumination of such a comprehensive work as a *Legendary* was by no means a rarity; on the contrary, it could be said that it was almost a rule in the monastic scriptoria, because such an extensive liturgical text was quite a task that demanded many hours of uninterrupted work and dedication. Therefore, it is not surprising that the Alcobaça's *Legendary* is a work of different hands, which sometimes worked simultaneously and sometimes in a consecutive way but all contributed to the stylistic variety of the manuscript, which nevertheless appears as a completed and coherent work of art.

The authors of the initials from Alc. 420 and most of the initials in Alc. 422 were two artists who were stylistically very close to the so-called Alcobaça's heavy style and who combined these elements with the elements from the Papias Master.[12] These initials have compact and dense bodies, foliage spreads in the bellies of the letters and is in most cases richly cross-hatched with tiny strokes of the pen.[13] Stylistically different are the initials from other volumes of the *Legendary*, namely Alc. 418, 419, 421, and partly Alc. 422. These are richly ornamented scrollwork initials that lay on the painted background, which follows the contours of each letter. The initials mark the beginning of each of the volumes or the beginning of every single legend through the text. Such initials are full of internal dynamics, movement and formal tension and are formed by somewhat surprising elements. It might be concluded that by the very deformation of the natural, by introducing bizarre and illogical elements, these initials represent some kind of late Romanesque mannerism, for which further artistic development is no longer possible.[14]

These initials were made by a master, or even better, a group of the masters who used the same formal terminology and followed similar formal patterns and models. These artists that worked in Alcobaça's scriptorium in the late 12th century are called "Masters of the late Romanesque mannerism". This type of illumination first appeared in the middle of the century in the monastery of Clairvaux, and it very clearly appears in the illuminated "monochrome" *Bible*. [15] Almost five decades later, the style re-appeared rather modified in the scriptorium of Cîteaux, where it flourished again.[16]

12 Navala, note 1, 122-133.

13 Navala, note 1, 145.

14 Navala, note 1, 146.

15 Troyes, Bibliothèque Municipale, Ms 27[1-5].

16 Y. Załuska, *L'Enluminure et le Scriptorium de Cîteaux au XIIe Siècle (Commentarii cistercienses, Studia et Documenta,* vol. IV), (Cîteaux: 1989), 160-167.

Fig. 3: Lisbon, Biblioteca Nacional de Portugal, *Legendary*, 2nd volume, Alc. 419, fol. 77r; *Legendary*, 4th volume, Alc. 421, fol. 131v; *Legendary*, 4th volume, Alc. 421, fol. 60v

The dualism of the formal construction of the initial (the scrollwork body and foliated ornament) disappears and the initial now becomes an inseparable item in which elements such as tendrils, all kinds of leaves, geometric elements, fruit, drapery, feathers and fantasy elements are drawn and added in order to create a fantastic and indeterminate composition that only schematically represents the body of a letter. This type of illumination is surprisingly optimistic, full of *joie de vivre* and points towards the new era, which will begin at the turn of the century.

In connection with the initials that can be attributed to the Masters of the late Romanesque mannerism, another formal distinction can be singled out: the design and the construction of different elements show that some of the elements seem to be continually repeating or appear one after another in the conception of the large initials or even ornamented quire signatures. A clear example of such repetition is the body of a dragon that sometimes appears as a "real" dragon with a drawn head, ears, and tail but sometimes only the form of its body is used as an abstract artistic element. These repeating elements such as globes with fan-shaped leaves, leaf ears or fan-shaped leaves appear not only in the *Legendary* but also in other manuscripts from the Alcobaça's scriptorium, for example in the so-called "cut out" *Bible*.[17] These repeating elements are always of the same size and meticulously reproduced at the conception of different initials from various manuscripts. On this basis, it can be supposed that the artist used stencils in order to facilitate the drawing of repeating elements. The use of the stencils made it possible for them to repeat the same vegetative element in the exact same way and size in different compositions.[18]

The possibility of the use of stencils in the scriptorium is an interesting detail, which demonstrates the use of technical devices within a scriptorium. It is easy to imagine the working process and that the copying and illumination of manuscripts was a team effort in which the artists exchanged folios with drawings of exempla and models as well as stencils, because this procedure enabled them to be more accurate and faster since the method facilitated the drawing of some of the more complex elements.[19]

Undoubtedly, the ornamented quire signatures are stylistically and morphologically tightly bound to the painted initials that

17 Lisbon, BN, Alc. 427-431.

18 N. Golob, 'Kadelne iniciale v dveh volumnih frančiškanskega graduala', in: *Zbornik za umetnostno zgodovino,* n.s. XXXVIII, (2002), 152-183.

19 R. W. Scheller, *Exemplum: Model-Book Drawings and the Pratice of Artistic Transmission in the Middle Ages (ca.900 – ca. 1470)* (Amsterdam: Amsterdam University Press, 1995).

Fig. 4: Lisbon, Biblioteca Nacional de Portugal, *Legendary,* 2nd volume, Alc. 419, fol. 92v; *Legendary,* 2nd volume, Alc. 419, fol. 98r

prevail in a formal and an aesthetic sense. Quire signatures mark in some manuscripts the end of each quire and in other manuscripts only the end of some of the quires with no evident methodology or order. In Alcobaça manuscripts only Roman numerals were used as the orientation in the process of book-binding. Marking the quaternions with quire signatures, which lie in the middle or at the right side of the bottom margin, was not consistent.

Furthermore: when one examines the materials, it can be deduced that the scriptorium of Alcobaça was deciding quite freely about marking or not marking the quaternions with quire signatures. Some quire signatures are also ornamented, mostly with calligraphic ornament. Only the fourth volume of the *Legendary* (Alc. 421) has the quire signatures, adorned by the elements of painted initials. [20]

The fourth volume of the *Legendary* (Alc. 421) is also one of the two volumes of this manuscript that still possesses the original binding, so its margins were never trimmed and the folio layout is still exactly as originally conceived in the 12th century. The ruling of this manuscript is very spacious, and the margins are opulently large and empty. The bottom margins, approximately 102 mm tall, offer enough space for the artist's intervention.

Ornamented quire signatures in Alc. 421 are closely connected to the painted initials of the manuscript, and together they form a unique stylistic and formal dialogue. Stylistically, they are very close to the type of illumination that can be attributed to the Masters of the late Romanesque mannerism. Such illuminated quire signatures are unique and exceptional in the Alcobaça's collection of the 12th century. Although the quire signatures are executed in a drawing technique with pen in black-brown tint, they can still be described as painted, because they adopt the formal language of the painted initials and are formed by the same elements that assemble the initials.

Ornamented quire signatures in Alc. 421 denote eleven out of thirty quaternions in the manuscript.

The authorship of the eleven ornamented quire signatures can be assigned to one single master, probably from the group of the Masters of late Romanesque mannerism.

20 Navala, note 1, 69.

Fig. 5: Lisbon, Biblioteca Nacional de Portugal, *Legendary*, 4th volume, Alc. 421, fol. 17v; *Legendary*, 4th volume, Alc. 421, fol. 49v; *Legendary*, 4th volume, Alc. 421, fol. 65v; *Legendary*, 4th volume, Alc. 421, fol. 81v; *Legendary*, 4th volume, Alc. 421, fol. 102r

However, the ornamented signatures are impossible to connect with certainty to individual initials in the text, and it is impossible to connect the master of the quire signatures to the exact parts of the illumination in the manuscript.

The Master of Alcobaça's quire signatures conceived the ornamental composition of all of them in the same way: above the Roman numeral, there is a stem carrying a floral ornament that spreads left and right of the bottom margin of the folio. The ornament consists mainly of leaves, which crown-like climb and envelop the top of the Roman numeral. The only non-floral elements are some pearl-studded globes and clasps. The artist used a fine pen, enabling him to draw fine parallel lines, giving the leaves and other parts of the drawing a certain depth and life-like appearance. Breaking down ornaments into their constituent parts, twelve types of leaves can be observed. Their comparatively large variety made it possible for the artist to produce a large selection of combinations.[21] All these elements can also be found in the formal conception of large painted initials throughout the text. It is interesting to note that these elements now appear singled out, individualized and with no connection to the other elements and no connection to the larger compositions of painted initials. Due to this singularity of artistic form, the quire signatures obtain a completely new aesthetic value; they are individualized as deliberate autonomous drawings, having the task of model drawing.

It can be said that the Master of the ornamented quire signature was most probably the author of the larger painted initials in Alc. 421. It also seems that while executing the quire signatures he deliberately singled out some of the elements and represented them individually, so that they could be exposed in their simple and singular beauty that is sometimes overlooked when they form more significant and more complex compositions. However, it is also possible that while painting the quire signatures the artist was "rehearsing his pen" and drew some elements on a small scale before using them as part of a more complex work. This can be observed at the tenth quire signature that, above the Roman numeral, represents a globe with filigree floral fan-shaped elements. Globes decorated with fan-like leaves represent an often-repeated motif also in initials. So, for example, in initial P on folio 102r, the motif decorates the body of the letter. This is why the vital question of methods and work practices within the scriptorium of the 12th century arises. In one way, it can be said that the quire signatures were conceived simultaneously with the large painted initials in the text and formed some kind of an echo or were even used as a "dictionary" of favourite and most essential elements. However, it is also possible that while executing these quire signatures the artist developed his own notebook of elements that he will be using for the large painted initials in an entirely novel and outstanding way.

It is also interesting to observe the rhythm of ornamented quire signatures through the manuscript. The first ornamented quire signature denotes the end of the first quaternion (folio 9v). After that, all subsequent quire signatures are ornamented until the fifth quire signature, which is not ornamented. The sixth quire signature is again ornamented and so are all quire signatures, including the eleventh. The twelfth quire signature is not ornamented, but the thirteenth is, and that is also the last ornamented quire signature in the manuscript. It is impossible to say why only eleven out of 30 quire signatures are ornamented and why the rhythm of this marginal artwork is suddenly interrupted at the first third of all the folios. Maybe it was the lack of time that obliged the artist to concentrate on "more important" initials and simply leave the margins empty. Alternatively, it is also possible that this artist was assigned only the first thirteen quaternions, and he simply decorated only those, so the remaining quaternions, assigned to other masters, were left blank.

It is probably not a coincidence that very similar crown-like leafy elements can be found in the Model-Book from the Cistercian Monastery in Rein in Austrian Styria.[22]

21 B. Benulič, 'Cistercian Legendarium (Alc. 421) from Alcobaça: The problem of ornamented quire signatures', in: *Zbornik za umetnostno zgodovino,* s. n. XLIII (2007), 210-217.

22 Vienna, Österreichische Nationalbibliothek, Cod. 507.

This model book of patterns and templates, of course, cannot be considered as one of the sources of the Alcobaça manuscript; nevertheless, it can be concluded that the same artistic ideas and convictions pervaded in the 12th-century Cistercian monastic art. The Rein Model Book also presents an example of how formal stylistic elements were spread among calligraphers and illuminators. In Alc. 421, there are several and various decorative elements (like the stylized forms of the dragon body, globes with filigree ornaments, fan-shaped leaves, stylized acanthus leaves etc.) that are stylistically not homogenous and point to the fact that its authors might have consulted certain models, templates and stencils to produce ornaments of this kind. [23]

Ornamented quire signatures in the fourth volume (Alc. 421) of the *Legendary* are undoubtedly unique. Although not all quire signatures are ornamented, those that are represent a crucial artistic element of the manuscript. They are the only representatives of so-called marginal or secondary art from the Alcobaça collection of the 12th century. In their artistic conception the individual stroke of the master can be singled out and, on the basis of the analysis of the elements that form the composition, his individual character can be determined. In his work, he allowed a certain interplay and complementation thus creating a whole which is in a way a dramatic and intense work of art. Analysis of the secondary and marginal artistic endeavours tells us a story about the work processes in the framework of the scriptorium where several different artists worked simultaneously and thus contributed to the execution of manuscripts that are today ranked as one of the most prominent representatives of the Cistercian Romanesque art.

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23 Benulič, note 21, 216.

Ana Krevelj

APOCALYPSE DRAWING AS A POSSIBLE SOURCE FOR A FRESCO DECORATION IN HARTBERG CHAPEL

Zusammenfassung

Dieser Beitrag präsentiert zwei Kunstwerke: das Pergamentblatt und die Fresken. Das Pergamentblatt befindet sich im Erzabtei St. Peter in Salzburg und ist um 1230 datiert. Die Federzeichnungen illustrierten primär die Apokalypse nach Johannes und auch andere Szenen wie die vier Könige auf Tieren sitzend. Sie sind im Vision des Propheten Daniel beschrieben. Könige auf Tieren treten ebenfalls im Freskenzyklus in dem romanischer Karner im Hartberg auf (um 1250 datiert). Die Fresken werden am Ende des 19. Jahrhunderts schwer restauriert und das ikonographische Programm wurde unerkennbar. Hier wird die Möglichkeit vorgestellt, dass das Pergamentblatt aus Salzburg mit Fresken im Hartberg Karner verbunden ist basierend auf dem Ursprungsdatum, dem Ursprungsort und der Ikonografie beider Kunstwerke.

Keywords: Apocalypse, Daniel's vision, 13th century, parchment, fresco cycle

This article presents two different works of art and focuses on a possible relationship between them: a drawing made on parchment and a fresco painting in a Romanesque charnel chapel. Both are located in Austria and are roughly dated to the first half of the 13th century.

The first work of art is a Romanesque drawing (Fig. 1), made on a rather large sheet of parchment (it measures 395 × 585 mm).[1] It was used as a binding of an account book for the years 1439 to 1470 in the treasury of the Archabbey of Saint Peter in Salzburg, Austria, where it is still located today.[2] To serve its secondary purpose as binding, the sheet was trimmed on all four sides (but not equally) and folded, so parts of the drawing, especially along the top and right margins, are lost. Freehand drawings were made in brown ink with some red or pink highlights and inscriptions in dark brown. They illustrate the visions of John the Evangelist from the Throne in Heaven, described in the Revelation, chapter 4 to the Heavenly Jerusalem shown to him by an angel in Revelation, chapter 21.

The scenes are represented as a complex diagram with three circles in the centre, of which the larger two are divided by diagonals to create a four-spoked double wheel. On each side of these concentric rings, there

1 L. V. Geymonat, 'Apocalypse Drawing', in: *Pen and Parchment, Drawing in the Middle Ages,* ed. by M. Holcomb <Metropolitan Museum of Art, 2nd June – 23th August 2009> (New York: Metropolitan Museum of Art, 2009), cat. 37, 130-133.

2 The parchment has no shelfmark, just an inventory number 975.

Fig. 1: Apocalypse drawing, Salzburg, Archabbey of Saint Peter, around 1230
(source: *Pen and Parchment, Drawing in the Middle Ages*, ed. by Melanie Holcomb, Metropolitan Museum of Art, 2 June–23 August 2009), New York 2009, cat. 37, 131)

are four semicircles. A few straight lines further subdivide the rest of the space. The available surface of the parchment is full of different figures with accompanying inscriptions and citations from the Bible. The smallest circle serves as the centre and represents the hand of the Lord blessing. All other figures and scenes are arranged concentrically, proceeding from the centre outward without following any other orientation.

In the second circle, there are four angels with scrolls with passages from the Book of Revelation and the names of evangelists inscribed next to each angel. The objects of our interest are depictions in the largest circle representing four crowned men with sceptres and orbs, each riding on a different beast. These are the four beasts described by the prophet Daniel in the Book of Daniel (7:6-9). They are coming out of the sea, surrounded by the winged heads of blowing winds.

The four horsemen outside the outer ring can be identified by inscriptions: they are Christ with a crossbow on a white horse, the Devil with a sword on a red horse, Hypocrisy with a pair of scales on a black horse, and Death with a hatchet on a pale horse.

The semicircle on the lower edge encloses seven angels in smaller circles, sounding the seven trumpets. In the centre, an angel binds a dragon. On the sides there are smaller scenes representing the beginning of an Apocalypse. The scenes on top are almost entirely lost, but inscriptions are preserved, and they mention angels John sees standing at the corners of the earth holding back the winds. The semicircle on the left represents God the Father crowning Jesus Christ, flanked by saints, prophets, patriarchs and martyrs below the throne and the semicircle on the right shows Christ in Majesty, surrounded by symbols of Evangelists and enclosed with elders on the left and angels on the right side.

The sheet was discovered and first published by an Austrian art historian Otto

Benesch in 1962.[3] He attributed the drawing to the school of Salzburg and dated it around 1230 based on its style. The so-called "Zackenstill" is a transitional style between Romanesque and Gothic. This linear style of the drawing corresponds to the style of Austrian frescoes of the 13th century. The nearest and stylistically very similar case are the wall paintings in a Romanesque church of St. George in Bischofshofen near Salzburg, also dated to around 1230. At that time, the town Bischofshofen was under the church jurisdiction of Archabbey of Saint Peter.[4]

Interesting is the remark Benesch made about this drawing. He described it as "a document of unique importance in the history of drawing. It is the only known design for a cycle of frescoes of the thirteenth century".[5] According to Benesch, the great wall painting cycles in the Middle Ages had to be based on previously made preparatory compositions, conceived by educated ecclesiastical patrons and then shown to artists as a guide. For him, this parchment is pointing in this direction, especially because of its diagrammatic layout that bears a resemblance to a design of a small chapel in a quadrangle form. There are some similar cases of this period in Austria, for example a bishop's chapel in Gurk in Carinthia or the chapel of St. Michael in Göss Abbey in Styria.[6]

Later, Johann Apfelthaler proposed that the drawing may have had other possible functions besides a possibility of being a draft for a wall-painting cycle.[7] It could be a didactic diagram for the visualization and memorization of the Apocalypse or an illustration for a manuscript containing a commentary on the Book of Revelation. He also pointed out the three questions regarding its origin, the time of creation according to its style and the use of theological sources.[8] For him, it is evident that the drawing was made in the Archabbey of St. Peter itself or at least somewhere in Salzburg area. The individual features of the drawing in linear style correspond to the artistic level in Salzburg until the middle of the 13th century and the complex programme indicates that certain theological sources must have been used.

Finally, Ludovico Geymonat agreed with Benesch in 2009.[9] He proposed that such drawings may have had a role in devising and carrying out the complex iconographic programmes that can be found on the walls of a number of 13th-century chapels. He also suggested that this particular drawing, according to its Salzburg provenance and visual evidence, was made for someone interested in Apocalyptic writings and who may have kept it within a scriptorium at his disposal and accessible to his students and followers. Finally, he concludes his theory with a question of whether this drawing was ever involved in the patronage of a painted cycle inspired by Daniel and the Revelation of John.

The second work of art represented in this article are wall paintings in a Romanesque charnel chapel in Hartberg in Styria (Fig. 2). The chapel, located south of the parish church, is a central building with apsis on the east side. It consists of two divided spaces: the ossuary, located partially underground and a chapel of St. Michael in a higher ground floor. The division is also accentuated on the facade with horizontal frieze.

3 O. Benesch, 'cat. 304', in: *Great Drawings of all Time,* ed. Ira Moskowitz (New York: Shorewood, 1962 – 1979), vol. II, no. 304.

4 Benesch, note 3, 304.

5 Although a few decades have passed since the first publication of the drawing and the remark Benesch made, it still represents a rare case of a possible prototype for a monumental wall decoration. Robert W. Scheller mentions only two similar cases from the 13th century: a *Vercelli rotulus* and the drawings with the so-called *Joinville Credo.* The *Vercelli rotulus* records the ruined frescoes in the local cathedral while the drawings of *Joinville Credo* are regarded as a design for a chapel mural. He also mentions the Apocalypse drawing and agrees with Benesch, mentioning that the drawing is showing the complete decorative programme of a small chapel cupola and its four supporting walls. R. W. Scheller, *Exemplum: modelbook drawings and the practice of artistic transmission in the Middle Ages (ca. 900-ca. 1470)* (Amsterdam: Amsterdam University Press, 1995), 36, note 121.

6 Benesch, note 3, 304.

7 J. Apfelthaler, 'Apocalypse-Blatt', in: *Hl. Rupert von Salzburg 696-1996. Katalog der Ausstellung im Dommuseum zu Salzburg und in der Erzabtei St. Peter,* ed. by P. Eder – J. Kronbichler <Dommuseum Salzburg, 16. Mai – 27. Oktober 1996>, Salzburg 1996, 449-451.

8 Apfelthaler, note 7, 450.

9 Geymonat, note 1, 130-133.

Fig. 2: Chapel of. St. Michael, Hartberg, around 1250 (source: Ana Krevelj)

It is not known when exactly the chapel was built, so the dating of its construction varies in the literature from the second half of the 12th century until the middle of the 13th century.[10] It is possible that the construction was connected with the parish priest Ulrich von Hartberg, who appears in written sources between 1163 and 1201. Ulrich was of noble background and had an excellent education. At first, he was the chaplain of the archbishop of Salzburg, Eberhard I (1147–1167) and at that time Salzburg also had a desire to establish a diocese in Hartberg. Later he was politically connected with Duke Leopold V. of Babenberg, who may also have contributed to the construction of the charnel chapel. In addition to St. Michael, the patron of the chapel was also St. Ulrich (until the end of the 16th century).[11]

Fig. 3: Interior of the Chapel towards the north (source: Ana Krevelj)

During the Baroque period, the interior was whitewashed, the apsis window was enlarged, and new openings were made. In 1715, fire destroyed the roof, and the frescoes were exposed to bad weather conditions for an extended period. The bad state of the chapel was noticed just at the end of the 19th century, and in 1893 an academic painter and restorer Teophil Melicher started with the restoration of poorly preserved and fragmentary frescoes within the whole restoration of the building (Fig. 3).[12]

The remaining frescoes were heavily restored or practically overpainted, and the lost parts were just supplemented by entirely new scenes. The result of this procedure was even at that time considered to be questionable and disturbing, especially by an art historian and conservator Johann Graus (employed by k. k. Central-Commission zur Erforschung und Erhaltung der Baudenkmale in Vienna), because the original iconographic programme was no longer clearly

10 E. Lanc, *Die mittelalterlichen Wandmalereien in der Steiermark* (Wien: Verlag der Österreichischen Akademie der Wissenschaften, 2002), 152-157 with complete list of older bibliography about Hartberg chapel of St. Michael.

11 R. Wagner-Rieger, 'Gotische Architektur in der Steiermark', in: *Gotik in der Steiermark. Landesausstellung veranstaltet vom Kulturreferat der Steiermärkischen Landesregierung im Stift St. Lambrecht vom 28. Mai bis 8. Oktober 1978,* ed. El. Langer (Graz: Kulturreferat der steiermärkischen Landesregiereung, 1978), 45-93; M. Schwarz, 'Die Architektur der Spätzeit (1200-1246)', in: *1000 Jahre Babenberger in Österreich. Niederösterreichische Jubiläumausstellung Stift Lilienfeld 15. Mai – 31. Oktober 1976* (Wien-Köln-Weimar: Böhlau, 1976), 511-522; M. SCHWARZ, *Die Baukunst des 13. Jahrhunderts in Österreich* (Wien-Köln-Weimar Böhlau, 2013), 77-80.

12 J. Graus, 'Romanische Malereien zu Hartberg', in: *Kirchenschmuck,* 1897, 3; S. Walter, 'Die Fresken im Hartberg Karner', in: *Zeitschrift des Historischen Vereines für Steiermark*, 1978, 185-190; Lanc, note 10, 153.

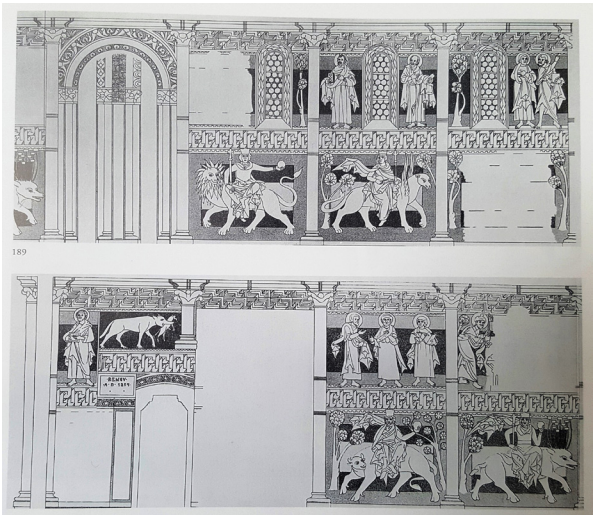

Fig. 4: Scheme of original parts of frescoes before the restoration by J. Graus
(source: E. Lanc, *Die mittelalterlichen Wandmalereien in der Steiermark*, Wien 2002, Figs. 189–190)

recognizable. Johann Graus spoke after the restoration with Theophil Melicher and made a scheme showing the original parts of frescoes according to Melicher's descriptions. The blank areas were later painted by Theophil Melicher (Fig. 4).[13]

The walls of the chapel are divided into two registers. The lower register represents seven crowned men riding different animals. They hold sceptres and orbs in their hands. Four of them (kings riding a bull, a boar, a lion and a winged panther) are according to Melicher more or less original. In the scene with the king on a horse, only the head of a horse is original, while the kings on the dragon and whale are new.

The upper register represents Christ enthroned with Peter and Paul and other standing figures defined as apostles. Only Peter and some standing figures are original. The scene with the devil dragging souls into the hellmouth is new, while the wolf with the lamb is reportedly original. The whole vault is entirely new. Melicher was inspired here by the fresco paintings in the Romanesque chapel of St. Catherine in Znojmo (Czech Republic), which he also restored previously.[14]

The painting in the apsis represents the family tree of Christ with the Virgin and Child in the centre, while the sleeping Jesse is missing. Here are also several additional scenes that cannot be explained without some doubt and cannot be iconographically defined with certainty.

In 1897 and 1902, Johann Graus suggested that the iconographic programme was based on a vision of St. Daniel of four kingdoms.[15] However, later there was a controversy in 1977–1979 between Elfriede Grabner,[16] who followed Graus and Sepp Walter,[17] who saw in seven riders "the oldest depiction of seven deadly sins in medieval Christian iconography" and whom many other scholars, such as Mario Schwarz, often quote.[18] Walter interpreted the lion as Pride, the camel (?) as Wrath, the horse as Sloth, the dragon as Envy, the whale (or basilisk) as Greed, the ox as Gluttony and the boar as Lust.

Elga Lanc[19] compared the scheme of Johann Graus with the descriptions of kings in St. Daniels vision, and although the whole cycle in the chapel still cannot be fully iconographically explained (the head of a horse, for example), she concluded that the original four riders do represent the vision of Daniel. She leaned her interpretation on a study of Edgar Marsch about the written sources on Daniel's vision.[20] Marsch evalu-

13 Lanc, note 10, 154.

14 Lanc, note 10, 154.

15 Graus, note 12, 2-7 and 17-20; J. Graus, 'Romanische Wandmalereien zu Pürgg und Hartberg', in: *Mitteilungen der k. k. Zentral-Kommission zur Erhaltung und Erforschung der Kunst- und Historischen Denkmale,* N. F. 28, 1902, 83-88.

16 E. Grabner, 'Die vier Reiterbilder im Karner zu Hartberg. Zur ikonographischen Einordnung und Deutung der im 19. Jahrhundert restaurierten romanischen Wandmalereien', in: *Zeitschrift des Historischen Vereines für Steiermark*, 1977, 221-244; E. Grabner, 'Zur Ikonographie Hartberger Karnerfresken', in: *Zeitschrift des Historischen Vereines für Steiermark,* 1979, 133-141.

17 S. Walter, 'Die Fresken im Hartberger Karner', in: *Zeitschrift des Historischen Vereines für Steiermark,* 1978, 185-238; S. Walter, 'Die Fresken im Hartberger Karner', in: *Zeitschrift des Historischen Vereines für Steiermark,* 1979, 143-150.

18 Schwarz, note 11, 77-80.

19 Lanc, note 10, 154-157.

20 E. Marsch, 'Die fünf Reiterbilder im Karner zu Hartberg', in: *Biblische Prophetie und chronographische Dichtung, Stoff- und Wirkungsgeschichte der Vision des Propheten Daniel nach Dan. VII* (Berlin: Schmidt, 1972), 89-96.

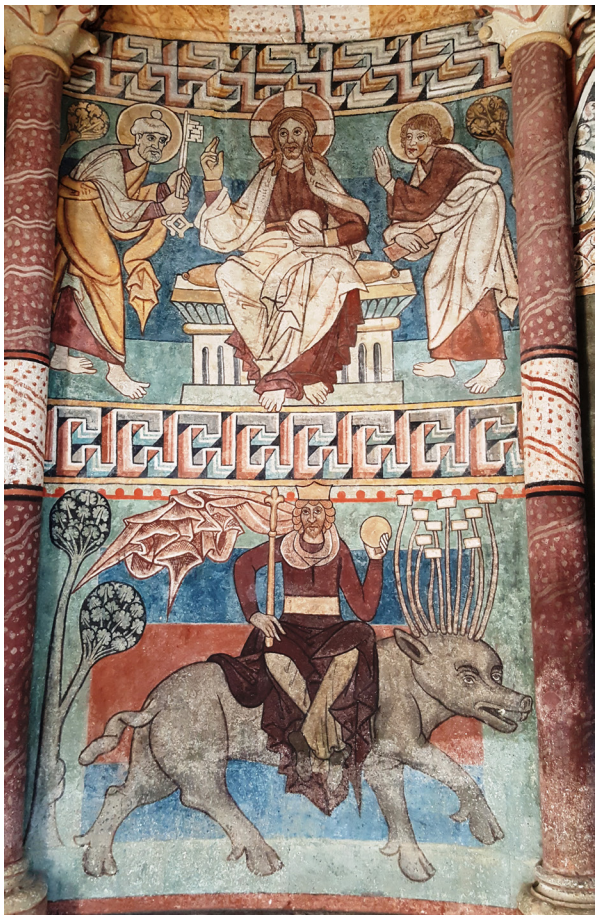

Fig. 5: Emperor August on a boar with ten horns and Christ enthroned between St. Peter and St. Paul. (source: Ana Krevelj)

ated the programme of the frescoes as the most crucial cyclic representation of this motif in the 13th century. He claims that the representation of the motif of four riders in the upper storey of the chapel expresses the importance of eschatological sense for the symbolic understanding of the Vision. In the chapel, Death and Salvation are ideally connected. The history of salvation is contrasted with the individual experience of death in a visionary-symbolic way. Christ enthroned and surrounded by apostles is represented upon these four rulers on beasts. They symbolize four world-kingdoms that will, according to Daniel's vision, be replaced by the true kingdom of God. The four beasts are positioned on each side of the apsis. Their sequence and appearance only partially follow Daniel's description.[21] The sequence is the same as in the chronicle *Historiae Adversus Paganos* of Paulus Orosius, who, according to Daniel, divides the world into four periods of dominion, which will finally be replaced by only one. The first ruler is Ninus from Babylon on a winged lion. The second is the Greek kingdom represented by Alexander the Great on a winged panther. Wings symbolize his rapid rise and a short reign. The panther has only one head instead of four, which in Daniel's vision symbolize Alexander's four successors. Orosius is writing about fourteen of them, so more panther heads were not relevant. The third kingdom is Egypt, represented by an ox (Apis) with Ptolemy and the last is Rome with Emperor Augustus riding on a boar with ten horns (Dan. 7.24). For Orosius, it was significant that Christ was born under the rule of Augustus. According to Marsch that is the reason that Christ enthroned is represented just above the fourth rider and that he symbolises the final dominion, the Kingdom of God (Fig. 5).[22]

Comparing the Apocalypse drawing on parchment from Archabbey of St. Peter in Salzburg and the frescoes in Hartberg chapel, some similarities are visible in the representations of kings on animals (Figs. 6a-6b). They are sitting majestically on their beasts with crowns on their heads and with orbs and sceptres in the shape of a lily in their hands. The drapery is swirling in the air in a typical "Zackenstill" form. The beasts on the drawing have never been seen in real life. They do not resemble any specific species but, because of their symbolic meaning and corresponding inscriptions, there was no need for this. What the beasts in the chapel looked like before the restoration,

21 After Daniel 7.3-12 the prophet saw in his dream a lion with wings of an eagle, a bear with three ribs in its mouth between its teeth, a leopard with four wings and four heads and the forth beast, which was terrifying, frightening and very powerful. It had large iron teeth and was different from all the former beasts, and it had ten horns. Between them there was a small horn which had eyes like the eyes of a human being and a mouth that spoke boastfully.

22 Marsch, note 20, 94-96; Graus (Pürgg und Hartberg, 1902), note 15 and Grabner, (Die vier Reiterbilder, 1977 and Zur Ikonographie der Hartberger Karnerfresken, 1979), note 16, present also other parallel examples of the same iconographic type based on Orosius' writings.

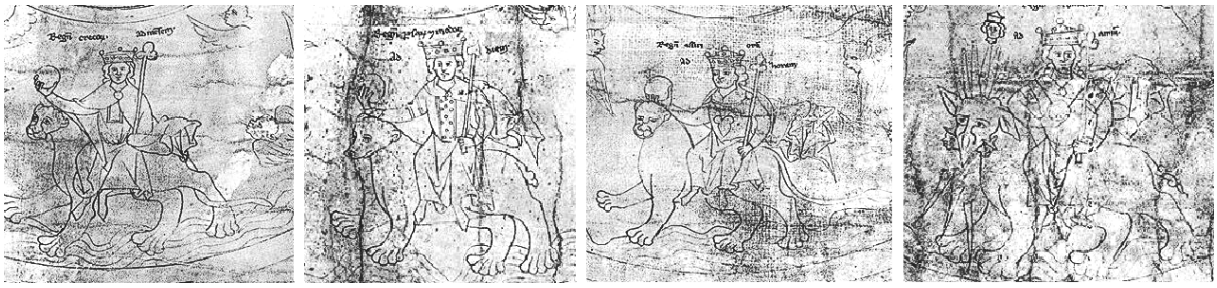

Fig. 6a. Details from Apocalypse drawing representing kings on beasts.
(source: same as Fig. 1)

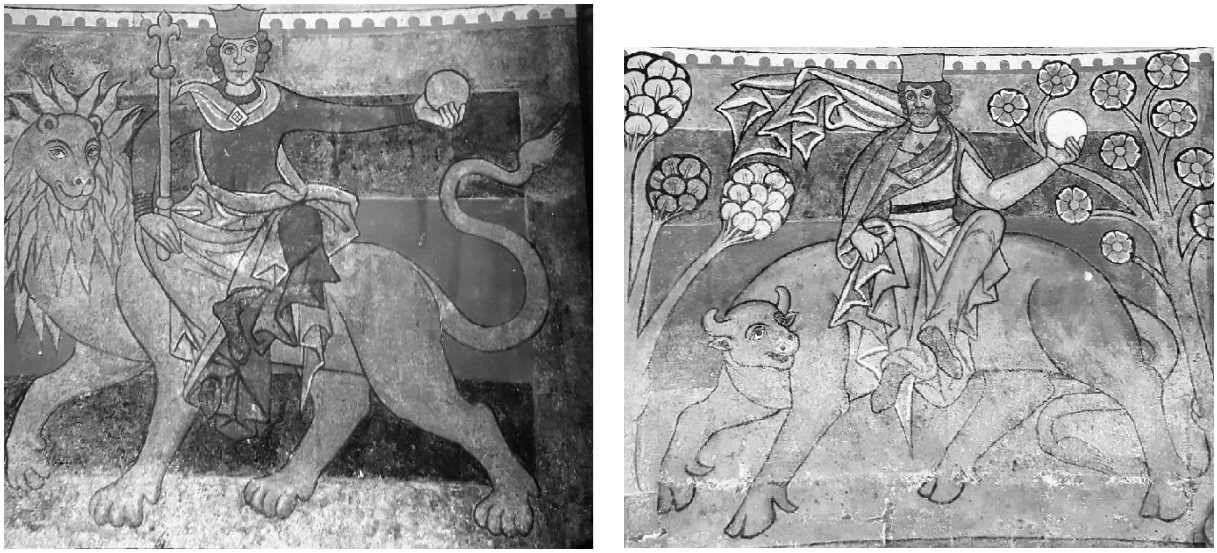

Fig. 6b. Details of two kings on beasts from the Hartberg Chapel
(source: Ana Krevelj)

we can only guess. I believe the lion did not have such an abundant mane, the panther could even lack wings, while the boar with ten horns looks very similar to the drawing variant. The discrepancies are to be expected. As Robert Scheller pointed out, it is generally difficult to demonstrate the use of illuminated manuscripts as prototypes for monumental wall decorations. The size and unique requirements of the wall surface and subdivision presuppose a different approach to that of the layout of an illuminated manuscript.[23] Fresco technique required fast work, making minute details such as in our drawing hard to copy accurately, so it is also reasonable to conclude that the author of the drawing was not skilled in fresco painting and that alterations were necessary.

Because of complete restoration of the original parts of the remaining frescoes in the 19th century and because of lack of photographic evidence of its original state before the restoration, it is impossible to date and stylistically define them accurately. Based on rough comparison with other related monuments, Elga Lanc dates the frescoes towards the middle of the 13th century.[24] The Apocalypse drawing is dated to around 1230 and placed in the Salzburg area. It has been mentioned before that Hartberg was also connected with Salzburg Archabbey through Ulrich von Hartberg and Salzburg's desire to establish new diocese in Hartberg at that time. We cannot overlook the fact that in Hartberg there are no scenes from Revelation of John as on parchment, although we should not forget that a large part of the cycle is missing (the whole vault for instance) and that the remaining parts were incorrectly completed or altered. It is also interesting

23 Scheller, note 5, 30.

24 Lanc, note 10, 157.

that Melicher included new scenes, such as the Mouth of Hell and a Dragon, which correspond to iconography of the Apocalypse.

The diagram of the drawing suggests that it may represent a design for quadrangle chapel while in Hartberg we have a rotunda. However, perhaps this exact distinction implies that in Hartberg we have a kind of an abbreviation of a larger scheme. As Ludovico Geymonat mentioned before,[25] this drawing could be made for someone interested in Apocalyptic writings and who may have kept it within a scriptorium at his disposal and accessible to his students and followers and that it might have influenced directly or indirectly the fresco cycle in Hartberg.

In conclusion, I would like to point out that the drawing and frescoes have some crucial common points (dating and style, connection with Salzburg and partial matching in iconography) and that this accidentally preserved parchment may represent rare evidence of existing pre-prepared schemes for complex fresco cycles in the 13th century. However, there are also some discrepancies between the two, so we can only assume that the drawing might directly or indirectly have influenced the Hartberg cycle. This is partially due to a heavy restoration in 19th century, which represents at least for the development of the restoration-conservation practice a critical lesson. All of this is partially due to a lack of information, which may lead to some further research on the topic.

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25 Geymonat, note 1, 133.

Marta Luigina Mangini

DRAWINGS ON PARCHMENT AND PAPER OF MEDIEVAL ITALIAN NOTARIES (12th–15th CENTURIES)

Riassunto

Il contributo ha lo scopo di portare all'attenzione l'ampia presenza di disegni e schizzi tracciati su pergamena e carta dai notai medievali italiani. Dagli esempi – differenti per area geografica, altezza cronologica e tipologia – risulta evidente che il know-how dei notai si esprimeva non solo attraverso parole e numeri, ma anche mediante segni e disegni più o meno estemporanei e funzionali alla propria attività. Infatti se già nella routine quotidiana, i notai dimostravano capacità grafiche tracciando segni speciali di autenticazione e disegnando a supporto di specifiche esigenze documentarie, non va dimenticato che oltre a queste manifestazioni grafico-artistiche strettamente connesse all'esercizio della propria professione, i notai spesso tracciavano sulle coperte di legatura, sui fogli di guardia e sulle pagine inutilizzate dei propri registri pergamenacei e cartacei disegni estemporanei, frutto della loro cultura poliedrica nonché dei loro sentimenti più intimi.

Keywords: Italy, Middle Ages, notaries, drawings

Contribution

Abundant scholarly literature exists on Italian notarial culture in the Middle Ages. Previous studies have tackled the vocational training of these professionals – that is, apprenticeship, technical know-how and problem-solving[1] – as well as their ability to use their knowledge outside the field of law. Regarding this last point, there are many attestations of notaries who followed different paths in terms of geographical, social, and occupational mobility, adding their writing activity to their work as doctors, apothecaries, moneylenders, accountants, surveyors, merchants, butchers, priests, teachers, poets, and so on.[2]

1 In general on this topic, see: *La produzione scritta tecnica e scientifica nel Medioevo: libro e documento tra scuole e professioni* (Atti del Convegno internazionale dell'Associazione italiana dei Paleografi e Diplomatisti. Fisciano-Salerno, 28-30 settembre 2009, ed. by G. De Gregorio and others, Spoleto: Fondazione centro italiano di studi sull'alto Medioevo, 2012).

2 *Notariorum itinera. Notai toscani del basso Medioevo tra routine, mobilità e specializzazione*, ed. by G. Pinto and others, (Firenze: Olschki, 2018); *Notariorum itinera. Notai liguri del basso Medioevo tra routine, mobilità e specializzazione*, ed. by V. Ruzzin (Genova : Società Ligure di Storia Patria, 2019) http://www.storiapatriagenova.it/Docs/Biblioteca_Digitale/SB/17ad39319c34c2e0a56490d1bf88c851/a2f8167ecc043750f2dddc89a1d3de01.pdf (last use 12.06.2019); A. Bartoli Langeli, *Notai. Scrivere documenti nell'Italia medievale* (Roma: Viella, 2006); *La langue des actes* (Actes du XIe Congrès international de diplomatique. Troyes, jeudi 11-samedi 13 septembre 2003, Paris : École nationale des chartes - Sorbone 2005) http://elec.enc.sorbonne.fr/CID2003 (last viewed 12.06.2019); P. Cammarosano, 'Laici ed ecclesiasti-

Aspects of the notaries' graphic culture are also well studied; even if this particular field of research has mostly focused on the paleographic aspects,[3] and especially on the notaries' skills in resorting, according to the circumstances, to quick or cursive scripts or else more formal and legible ones modelled on the contemporary book lettering.

The fact that medieval Italian notaries expressed their know-how not only through words and numbers but also through signs, drawings, and sketches has remained at the fringes of this strand of research.[4] In this sense, scholars have afforded their attention to this aspect only in those rare cases in which the art of drawing became a complementary profession to, or even overtook, the legal one.

In this respect, one can mention Francesco Barberino from Florence (1264–1348), who met Giotto in Padua and drew inspiration from him for the allegorical designs of the *Documenti d'Amore*, which date from 1309–1313.[5] Another example is Neri from Rimini (c. 1270–1338), an illuminator, educated in the milieu of 13th-century Bolognese artists, who at the same time worked as a notary and was regularly registered in the local college of notaries.[6] Others include Matteo di Pietro di Bernardo from Umbria (1430/1435–1507), and his son and grandson Girolamo and Bernardo from Gualdo Tadino, most of whose artworks in oil on board are still kept in the Pinacoteca of Nocera Umbra.[7]

The examples may continue, but the aim of this paper is not to reflect on these and other remarkable cases that seem destined to remain numerically limited. Instead, I want to focus on some common, though no less diverse and relevant, elements that represent the Italian medieval notaries' heritage of graphic skills. I will, therefore, consider signs and drawings used by notaries in their daily professional routine as well as in their private life as means and spaces of free self-expression.

Higher artistic episodes aside, it is essential to point out that all notaries were required to have graphic skills to design, to place the writing on each page, to ensure the correct assembly of the quires and to signal clearly the division between each section. For these purposes, notaries exploited models and elements derived from book culture, wherein, especially from the 12th century and throughout Europe, a clearer demarcation of the textual sections developed so as to

ci nella produzione italiana di scritture dall'alto medioevo all'età romanica', in: *Libri e documenti d'Italia: dai Longobardi alla rinascita delle città*, Atti del Convegno Nazionale dell'Associazione Italiana Paleografi e Diplomatisti, Cividale, 5-7 ottobre 1994, ed. by C. Scalon (Udine: Arti Grafiche Friulane, 1996) 1-14; A. Pratesi, 'Appunti per una storia dell'evoluzione del notariato', in: *Studi in onore di Leopoldo Sandri* (Roma : Ufficio centrale per i beni archivistici, della Scuola speciale per archivisti, bibliotecari dell'Universita di Roma, 1983), 759-772, also in A. Pratesi, *Tra carte e notai. Saggi di diplomatica dal 1951 al 1991* (Roma: Società alla Biblioteca Vallicelliana, 1992), 521-535; E. Petrucci, 'An clerici artem notariae possint exercere', in: *Studi in onore di Ottorino Bertolini*, vol. II (Pisa: Pacini, 1972), 553-598; A. Petrucci, *Notarii. Documenti per la storia del notariato italiano* (Milano: Giuffré, 1958), 3-44.

3 In general, on this topic, see: G. Nicolaj, 'Alle origini della minuscola notarile italiana e dei suoi caratteri storici', in: *Scrittura e civiltà*, 10 (1986), 49-82.

4 A. Ghignoli, '*Writing Texts, Drawing, Signs. On Some Non-alphabetical Signs in Charters of the Early Medieval West*', in: *Archiv für Diplomatik*, 62 (2016), 11-40; J.F. Hamburger & B.M. Bedos-Rezak, *Sign and design. Script as image in cross-cultural perspective (300-1600 CE)* (Washington : D.C. Dumbarton Oaks Research Library and Collection, 2016); A. Ghignoli, '*Segni di notai. Scrivere per note e per segni in testi di chartae pisane dei secoli VIII-XI*', in: *Bullettino dell'Istituto storico italiano per il medio evo*, 115 (2013), 45-95.

5 Francesco da Barberino is the author of both text and illustrations of the *Documenti d'amore* now kept at Biblioteca Apostolica Vaticana, *Barb. lat.* 4076 (digital reproduction of the manuscript available at http://digi.vatlib.it/view/MSS_Barb.lat.4076, last viewed 12.06.2019), and illustrated it now kept at Biblioteca Apostolica Vaticana, *Barb. lat.* 4077 (digital reproductions of the manuscript are available at http://digi.vatlib.it/view/MSS_Barb.lat.4077, last viewed 12.06.2019); see E. Pasquini, 'Francesco da Barberino', in: *Dizionario Biografico degli Italiani*, 49 (Roma: Istituto della Enciclopedia italiana, 1997), 689-691, http://www.treccani.it/enciclopedia/francesco-da-barberino_%28Dizionario-Biografico%29/ (last viewed 12.06.2019); *Il notaio nella civiltà fiorentina. Secoli XIII-XVI*, <Mostra nella Biblioteca Medicea Laurenziana, Firenze, 1° ottobre-10 novembre 1984> (Firenze : Vallecchi, 1984), sheets 275 and 281.

6 S. Nicolini, 'Neri da Rimini', in: *Dizionario biografico dei miniatori italiani. Secoli IX-XVI*, ed. by M. Bollati (Milano: Edizioni Sylvestre Bonnard, 2004), 816-820; A. Iafrate, 'Neri da Rimini', in: *Dizionario Biografico degli Italiani*, http://www.treccani.it/enciclopedia/neri-da-rimini_(Dizionario-Biografico) (last viewed 12.06.2019).

7 *Matteo da Gualdo. Rinascimento eccentrico tra Umbria e Marche*, ed. by E. Bairati and P. Dragoni (Città di Castello: Electa editori umbri associati, 2004).

support the efforts of conceptualization and memory.[8] If necessary notaries were able to put texts in a bi-columnar *mise en page*, to organise records into several sections separated by white lines, to assign running titles, to use brackets, line-fillers, compartments, paragraphs, *pieds-de-mouche*, reference signs, marginal markings, pointing hands, arrows to point out initials, distinctive writing and friezes, and so on. So much so that, to borrow Carl Nordenfalk's words, we can say that "practical purpose has been the mother of artistic invention".[9]

Medieval Italian notaries employed these devices in when compiling the *libri iurium*, papers and registers intended to represent the institutions for which they worked. Among the many such cases detected during the MECA project,[10] we can mention as an example the initials, slightly detached from the rest of the word and ornate with floral motifs, written in brown and red ink at the beginning of the 13th century by the notaries responsible for the *Registro delli Instromenti Antichi del monastero di Chiaravalle Milanese*;[11] or else the figurative signatures placed at the end of each quire

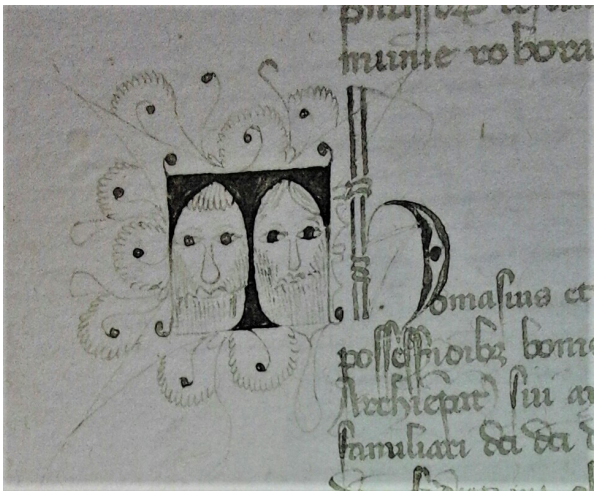

Fig. 1: Initial decorated in Ambrosolo Aresi's notarial register (1362–1364). Milano, Archivio di Stato, *Atti dei notai*, b. 9

intended to guide the binder in assembling the coeval *Liber continens exempla instrumentorum et actorum pertinencium et spectancium hospitali Beati Bartholomei Cumane, ordinis Cruciferorum.*[12]

However, notaries typically employed similar devices also in contexts not intended for public fruition, with the simple purpose of effectively reporting the beginning of the acts in their own registers. One such example is provided by the acts of notary Ambrosolo Aresi from Milan who customarily drew decorated initials outside the text justification (Fig. 1).

Similarly, the notaries Pietro di Lorenzo from Vertova (1288),[13] Pietro Sforzatica from Bergamo (1302)[14] and Guarisco Bonafede, also from Bergamo (1309),[15] drew friezes with beautiful anthropomorphic and geometric decorations.[16]

Highly symbolic signs and drawings were programmatically placed also on the

8 R. Assunto, 'Scrittura come figura, figura come segno', in: *Rassegna della Istruzione Artistica*, II/2 (1967), 5-18 and II/4 (1967), 5-15; M.T. Clanchy, *From memory to written record. England 1066-1307* (Blackwell: Oxford-Cambridge Mass., 1993²), 132-135 and 172-177; R. Chartier, *L'ordre des livres. Lecteurs, auteurs, biliothèques en Europe entre XIVe et XVIIIe siècle* (Aix-en-Provence: Alinéa, 1992); P. Fioretti,'Ordine del testo, ordine dei testi. Strategie distintive nell'Occidente latino tra scrittura e lettura', in: *Scrivere e leggere nell'Alto Medioevo* (Atti del convegno, Spoleto, 28 aprile-4 maggio 2011, Spoleto: Fondazione Centro Italiano di Studi sull'Alto Medioevo, 2012), 515-551.

9 C. Nordenfalk, 'The Beginning of Book Decoration' in: *Essays in honor of Georg Swarzenski*, ed. by O. Goetz (Chicago-Berlin: Henry Regnery in cooperation with Verlag Gebr. Mann, 1951), 9-20; republished in C. Nordenfalk, *Studies in the History of Book Illumination*, (London: The Pindar Press,1992), 1-8.

10 C. Carbonetti and others, 'Les cartulaires ecclésiastiques de l.'Italie médiévale', in: *Mélanges de l.'École française de Rome - Moyen Âge*, 127/2 (2015), https://mefrm.revues.org/2655?lang=it (last viewed 12.06.2019). The *Medieval European Cartularies Project* (MECA) is still ongoing, for further information see: http://www.efrome.it/it/la-ricerca/programmi/programmes-2017-2021/meca-medieval-european-cartularies.html (last viewed 12.06.2019).

11 M.F. Baroni, 'I documenti su "libro", il "libro" come documento. Un registro di Chiaravalle (sec. XIV)', in: *Libri, e altro. Nel passato e nel presente* (Milano: Mondadori, 2006), 55-64.

12 F. Fossati, 'Codice dei Cruciferi di Como', in: *Periodico della Società Storica Comense*, 1 (1878), 155-174.

13 Archivio di Stato di Bergamo, *Notarile*, fasc. 3, f. 35r.

14 Archivio di Stato di Bergamo, *Notarile*, fasc. 2b, ff. 18r, 31v, 46v, 47r.

15 Archivio di Stato di Bergamo, *Notarile*, fasc. 4, f. 20r.

16 In general, on this topic, see: G. Cavallo, 'Iniziali, scritture distintive, fregi. Morfologie e funzioni', in: *Libri e documenti d'Italia: dai longobardi alla rinascita delle città* (Atti del Convegno Nazionale dell'Associazione Italiana Paleografi e Diplomatisti, Cividale, 5-7 ottobre 1994, ed. by C. Scalon (Udine: Arti Grafiche Friulane, 1996), 15-33.

covers of the registers containing the acts of the ecclesiastical and civic institutions for which they worked. In this regard, we can mention the coats of arms of the podestà on the register of the court records of Bologna[17] and Florence,[18] or other coats of arms of the city gates on the oldest registers of the city of Milan,[19] or again other self-representative images, such as the detailed prospectus of the façade of the cathedral of St. Maria Maggiore in Milan, drawn on the parchment cover of its first register (1387–1401) by the same notary responsible for writing the records.[20]

These drawings are mostly on parchment. Sometimes they were drawn with the same ink used for writing the deeds and were intended to remain monochromatic; others were sketched with ink and then tempera-coloured using the same techniques, materials, and procedures used for illuminating manuscripts. In some Florentine registers, the indications, written in the vernacular by the notary as a reminder for the correct colouring of the blazons, remain visible. It is therefore not by chance that in analysing these drawings Ruth Wolff has called them "notarial illuminations".[21]

Registers of civil and ecclesiastical institutions aside, we find signs and drawings also on the bindings or on the first folio of notarial registers: coats of arms of aristocratic families – like the one belonging to the Sermondi family, drawn by notary Simone Sermondi of Bormio on his first register (1559-1567) –;[22] sacred images with invocative functions;[23] depictions referring to the name of the notary – like the *psicostasia* (Fig. 2) depicting the archangel Michael weighing souls[24] drawn by notary Michele Mussi from Piacenza on the first folio of his register (1309-1310) –;[25] and specific recognition signs, or *signa notarii*, specially conceived by each notary at the very beginning of his career.[26] These *signa notarii* were initially designed around the invocative symbol of the cross associated with Tironian notes referring to the words *notarius* and *iudex*.[27]

17 M. Vallerani, 'I disegni dei notai', in: *Duecento. Forme e colori del Medioevo a Bologna,* ed. by M. Medica and S. Tumidei, <Catalogo della mostra, Bologna, 2000> (Venezia: Marsilio, 2000), 75-83.

18 R. Wolff, 'Visualizzazioni giuridiche in pietra e su pergamena. Gli stemmi dei Podestà di Firenze', in: *L'arme segreta. Araldica e storia dell'arte nel Medioevo (secoli XIIIXV)*, by M. Ferrari (Firenze: Le Lettere, 2015), 207-220.

19 M.L. Mangini, 'Parole e immagini del perduto Liber instrumentorum porte Cumacine (Milano, metà del secolo XIII)', in: *Ianuensis non nascitur sed fit. Studi per Dino Puncuh,* by C. Bitossi and others (Genova: Società Ligure di Storia Patria, in the press).

20 Milano, Archivio Storico Civico e Biblioteca Trivulziana, Cod. Arch. C 6, *Atti della Fabbrica del Duomo* (1387-1401).

21 Wolff, note 18, 217.

22 Sondrio, Archivio di Stato, *Notarile*, Pergamene sciolte, n. 485 and Sondrio, Archivio di Stato, *Notarile*, vol. 1386. R. Pezzola, *Pergamene sciolte dell'Archivio notarile di Sondrio. Ricognizione informatizzata (secoli XI-XVII)* (Morbegno: Ad Fontes, 2012), http://www.adfontes.it/biblioteca/scaffale/rp-assosciolte/indice.html (last viewed 12.06.2019).

23 For example, according to the statutes of Bologna of 1389, notaries must draw a sacred image on each of their registers: "in eorum libris pictas figuras domini nostri Iesu Christi et beate Marie virginis ac sancti Iohannis evangeliste sub pena vigintiquinque librarum Bononiorum pro quolibet omitente. Et quod tempore quo sacramenta aliqua per iudicem aut notarios deferuntur, ipsi tales quibus sacramentum deferritur iurare debeant et sacramentum per eosdem prestare ad sancta Dei evangelia, manu tactis figuris predictis" in *Gli statuti del Comune di Bologna degli anni 1352, 1357; 1376, 1389 (libri I-III)*, ed. by V. Braidi (Bologna, Deputazione di Storia Patria per le Province di Romagna, 2002), 999; see also G. Tamba, 'Gli atti di giurisdizione civile nella Camera actorum del Comune di Bologna (secoli XIV-XV)", in: *La documentazione degli organi giudiziari nell'Italia tardo-medievale e moderna* <Atti del Convegno di studi, Siena, Archivio di Stato, 15-17 settembre 2008>, ed. by A. Giorgi and others (Roma: Ministero per i beni e le attività culturali, Direzione generale per gli archivi, 2012), 249-274; cf. 260.

24 F. Gennari, 'I disegni dei notai: primi risultati di un'indagine sui registri del Fondo Notarile dell'Archivio di Stato di Piacenza (secc. XIV-XV)', in: *In signo notarii* <Atti della giornata di studi Piacenza, Archivio di Stato, 24 settembre 2016 - Giornate Europee del Patrimonio 2016>, ed. by A. Riva (Genova : Società Ligure di Storia Patria, 2018), 32-69: 56-58, http://www.storiapatriagenova.it/BD_vs_contenitore.aspx?Id_Scheda_Bibliografica_Padre=5975&Id_Progetto=0 (last use 12.06.2019).

25 F. Gennari, 'Protocollo del notaio Michele Mussi', in: *I misteri della cattedrale. Meraviglie nel labirinto del sapere*, <Piacenza, Cattedrale di Santa Maria Assunta, 7 aprile - 7 luglio 2018> (Milano: Skira, 2018), 94-95.

26 *Signa et insignia. Storia, notariato ed archivi notarili in* Italia, <Catalogo della mostra Firenze, 30 settembre-6 ottobre 1984> (Roma: Arti grafiche Jasillo, 1984); *Ego signavi et roboravi. Signa e sigilli notarili nel tempo*, ed. by A. Rovere, <Settimana della cultura, 22 aprile 2010, Genova, Complesso monumentale di Sant'Ignazio> (Genova: Brigati, 2014).

27 *Ego signavi et roboravi*, note 26, 3-6.

Fig. 2: Archangel Michael weighing the souls, drawing by the notary Michele Mussi of Piacenza on the first leaf of his register (1309-1310). Piacenza, Archivio di Stato, *Atti dei notai*, b. 15

From the beginning of the twelfth century, notaries started to design personal signs of recognition, making them deliberately complicated so as to prevent imitations and guard themselves from counterfeiters. Starting from this period, the graphic elaborations of *signa notarii* assumed the most varied forms according to the imagination and inspiration of each notary: spanning from the essential and geometrically stylized *signa* typical of Genoese notaries who, from the first half of the 12th century, used the personal pronoun *Ego*;[28] to the more complex, composed by intertwining the letters of the first name and the surname of each professional. Among these are the *signa* of Oddo *de Torsellis de Colliculo* (first half of the 13th century) who apparently had fun playing with his palindrome name,[29] and those of notaries Antonio di Padova (1299) and Andreas *Capitaneis de Vicomercato* from Como (1476) who elaborated personal monograms. Other notaries adopted *signa* that included drawings with reference to onomastic, toponomastic, anthropomorphic, zoomorphic, phytoomorphic, and architectural elements,[30] while others are evocative of Christian symbology, such as crosses, fish, Mount Golgotha, and pelicans.[31]

Different from *signa notarii*, but comparable to them due to their function which was strictly instrumental to the documentary context, are those drawings – human figures[32] and animals[33] – that sometimes notaries put in the margins of documents to quickly find them or within certain deeds in order to better describe the subject of the contracts.

We can mention several of these cases. For example, the three drawings, in brown and red ink and tempera on parchment, of the dome of Florence drawn between 1420 and 1421 by Giovanni di Gherardo from Prato, a notary but also a scholar of optics and architecture, to support a complaint against Filippo Brunelleschi accused of not respecting the programmes and methods established for the realization of the building.[34]

Another example could be the *signa figurata* stamped on some fabrics of fustian

28 *Ego signavi et roboravi*, note 26, 9-16.

29 Genova, Archivio di Stato, Archivio Segreto, 348, Paesi, Finale, n. 3; see *Ego signavi et roboravi*, note 26, 43-44.

30 *Ego signavi et roboravi*, note 26, 33, 45-55.

31 Genova, Archivio di Stato, Archivio Segreto, 342, Paesi, Bagnasco, n. 4; see *Ego signavi et roboravi*, note 26, 39.

32 *Il cartulario di Arnaldo Cumano e Giovanni di Donato. Savona, 1178-1188*, ed. by L. Balletto and others (Roma: Ministero per i Beni Culturali e Ambientali, 1978), deeds number 93, 517, 769.

33 As we can see, for example, in *Il cartulario di Arnaldo Cumano*, note 32, deeds number 30 and 37; or in *Corradus Cossigi*'s registers: this notary drew a bird alongside those notarial deeds relative to the Cathedral of Cremona (1305-1346), Cremona, Archivio di Stato, *Notarile*, b. 5.

34 *Filippo Brunelleschi: l'uomo, l'artista*, ed. by P. Benigni, <Mostra documentaria, Firenze 1977> (Firenze: Biemme 1977), 45-46, exhibition sheet number 45; *Il notaio nella civiltà fiorentina. Secoli XIII-XVI*, <Mostra nella Biblioteca Medicea Laurenziana, Firenze, 1° ottobre-10 novembre 1984> (Firenze: Vallecchi, 1984), 264-265, exhibition sheet number 282.

Fig. 3: *Signa figurata* depicted by notary Marcolo di Golasecca (1369). Milano, Archivio di Stato, *Atti dei notai*, b. 13

Fig. 4: Courtship scene by notary Giovanni from Pontenure (1371/72–1374). Piacenza, Archivio di Stato, *Atti dei notai*, b. 405

sold in Milan on June 10, 1369, and graphically depicted by notary Marcolo di Golasecca in the record of the sale (Fig. 3).[35] Similarly relevant are the stylized, elementary, and completely devoid of perspective representations of a section (between Lambrate and Linate) of the River Lambro by the notary designated to draw up the text of the sentence of a dispute concerning the management of the waters pertaining to the monastery of Chiaravalle.[36]

In these, as in other cases that could be mentioned, we are considering drawings that are functional to the purpose of the document, yet they also indirectly inform us of the notaries' personal graphic skills: sometimes elementary, other times remarkable. Entirely for different purposes, even if often handed down within the same documentary context, are the many and mostly monochromatic sketches through which notaries expressed their iconographic microcosm. It often happened that, outside the more official dimension, these professionals indulged in extemporaneous graphic-artistic expressions, which not by chance were called *iscioperii* by the Florentines. These automatic or semiautomatic signs frequently stud the guardsheets, bindings and margins of the professional books of notaries. We can consider these drawings as free manifestations of each notary's personality, of his emotions and cultural interests.[37]

The writing surface that these sketches occupy and the space that notaries

35 Milano, *Atti dei notai*, b. 13, image published in A. Liva, *Notariato e documento notarile a Milano dall'Alto Medioevo al Settecento* (Milano : Giuffré, 1979), picture number VIII.

36 Milano, *Fondo di religione*, 2434, image published in *L'immagine interessata. Territorio e cartografia in Lombardia tra '500 e '800* (Como : New Press, 1984), 155 and 160, picture number Acque 1.

37 Courtship scene by notary Giovanni from Pontenure (1371/72-1374), in Piacenza, Archivio di Stato, *Atti dei notai*, b. 405 (Fig. 4).

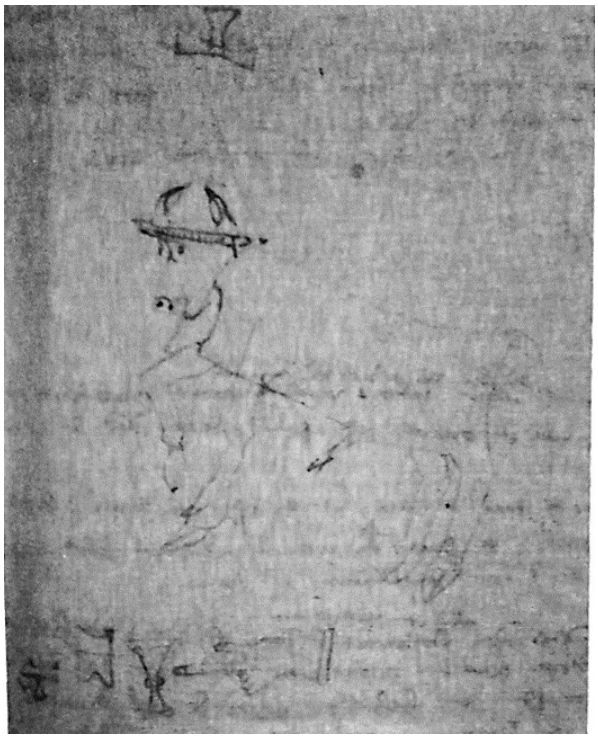

Fig. 5: Notary Silvestro Bossi's self-symbolic representation (1403). Milano, Archivio di Stato, *Atti dei notai*, b. 111

deliberately left empty or for other uses allow us to imagine the way each professional thought of himself in space and time.

In this regard, we can mention the emblematic case of early 15th-century notary Silvestro Bossi from Azzate[38] who between a record and the other of his register drew a clumsy ox with a pen in his mouth, and surmounted by a cross, under whose hoofs he added a caption with the pronoun *Ego* followed by three other sketches – a banner, a chalice and a pointing hand. If we break down this drawing we can easily understand the message the notary was trying to convey (Fig. 5): *I am a member of the important Bossi family* (whose surname comes from the Latin word *bos*, *bovis*, that is ox); *I am endowed with a strong identity* (suggested by the first person singular personal pronoun *ego*) *embodied by my coat of arms* (as we can see in the banner); *I am a good Christian* (this idea is represented by the chalice); and finally, *I am a notary* (evoked by the hand, his main working tool).[39]

Yet drawings are not always carefully considered representations. Often, these sketches were produced in response to a double process of automatism and projection. They are spontaneous evidence of a perceptive and graphic-expressive skill that normally remains limited within fixed patterns.

Notarial culture, therefore, allowed notaries to express themselves freely in the choice of iconographic themes such as more or less real and identifiable human figures, landscape views, allegorical, heraldic, phyto-zoomorphic elements. However, at the same time, it was also a culture in which some figurative themes – mostly pornographic and sacred elements – were repeated almost obsessively. In any case, these drawings show us the most intimate fragments of the context in which medieval Italian notaries mingled, operated, and after all spent their entire existence.[40]

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38 For Silvestro Bossi's biography see *Notai del contado milanese in età viscontea (1347-1447)*, ed. by M. Lunari and others (Milano: Unicopli, 2009), sheet number 33.

39 F. Del Tredici, *Un'altra nobiltà. Storie di (in)distinzione a Milano. Secoli XIV-XV* (Milano: Franco Angeli, 2017), 63-75.

40 All illustrations are published with the permission of the Ministero dei Beni e delle Attività Culturali d'Italia.

Ivana Prijatelj Pavičić

THE SO-CALLED OHMUĆEVIĆ GENEALOGY (KRALJEVA SUTJESKA GENEALOGY) IN THE LIGHT OF THE RESULTS OF RECENT ICONOGRAPHIC, HISTORICAL, HERALDRY, AND RESTORATION RESEARCH PAPERS

Riassunto

Negli ultimi anni, alcuni autori hanno studiato la cosiddetta genealogia di Ohmućević, precedentemente associata al dipinto Il Cristo e il Donatore (re bosniaco Stjepan Tomaš?) di Lovro Dobričević dalla galleria Strossmayer di Zagabria. La genealogia e il dipinto provengono dal monastero Francescano di Kraljeva Sutjeska (Bosnia ed Erzegovina).

Il documento cerca di presentare i risultati delle recenti ricerche iconografiche, storiche, araldiche e di restauro sulla genealogia. Inoltre l'autore sottolineerà alcuni fatti storici relativi alla "doppia reliquia" di Kraljeva Sutjeska, di cui uno storico croato Stjepan Ćosić ha recentemente scritto. L'autore, tra le altre cose, mostra che nell'interpretazione della cosiddetta genealogia Sutjeska della famiglia Ohmućević - che include gli stemmi del regno Illirico e quello Slavo – si dovrebbe tenere presente che essa manifesta la concezione della Nuova Era di nazione dicendo che il Regno Bosniaco è il nucleo di Illiria. È importante notare che quando la suddetta genealogia fu fatta, l'ex Regno Bosniaco fu sotto il dominio dei Turchi Ottomani. Come espressione dell'idea dell'allora reintegrazione ideologica, gli stemmi dei paesi Illirici (Bosnia, Erzegovina, Rascia, Croazia e Dalmazia) sono collegati allo stemma composito nella cosidetta genealogia di Sutjeska.

Alla fine del documento, l'autore farà riferimento alla sfida museale, alla futura presentazione dell'immagine di Cristo e del Sovrano e alla genealogia di Sutjeska, dal 2010, quando la genealogia menzionata è stata conservata in una cartella separata depositata nel ripostiglio della Galleria, cioè esso non è più stato esposto nella Galleria.

Keywords: Ohmućević genealogy, Petar Ohmućević, Lovro Dobričević, the Dead Christ and King Stephen Tomaš (Stjepan Tomaš), The Strossmayer Gallery of Old Masters (Strossmayerova galerija starih majstora)

Introduction

The topic of this paper is the so-called genealogy of Kraljeva Sutjeska (Fig. 1) also called the Ohmućević (Ohmučević) genealogy, which was removed a few years ago from the back of the painting of Christ and the Donor in the Strossmayer Gallery in Zagreb (Fig. 2). The painting has recently been attributed to the

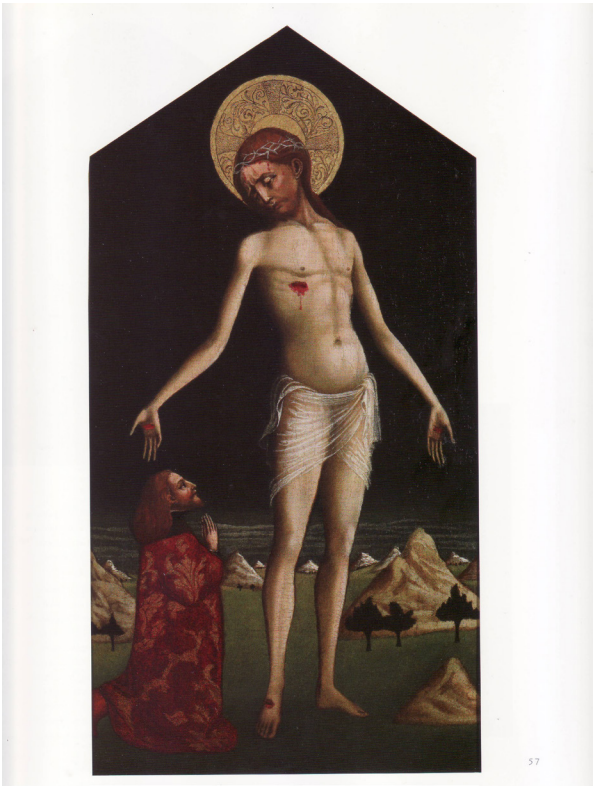

Fig. 1: Lovro Dobričević, Christ and the Donor (King Stjepan Tomaš?), The Strossmayer Gallery of Old Masters, Zagreb, c. 1460 (photo: Natalija Vasić)

15th-century painter Lovro Dobričević from Kotor.[1] It seems plausible that the person depicted in the painting was Stjepan Tomaš (1443-1461), the Bosnian King. Bishop Josip Juraj Strossmayer borrowed Dobričević's painting from the friars of Sutjeska Franciscan monastery in 1871.

The genealogy was named after the noble Ohmućević family, who lived at Slano near Dubrovnik.[2] The researchers suppose that the genealogy was commissioned by Petar (Pedro) Ivelja Ohmučević (died 1599), an Admiral of the Spanish Armada in the late 16th century. The year 1482 is written in the Ohmućević genealogy as the year that it was completed. It is the year of the fall of Herzegovina under the Ottoman rule**.** The genealogy was commissioned in the late 16th century. It is a charter written on paper depicting the genealogical tree of Bosnian and Serbian kings, the coats of arms of Illyria and the so-called Illyrian countries (Bosnia, Rascia, Dalmatia, Croatia and Herzegovina), and the coat of arms of the Ohmućević family.

Some researchers have wondered whether it was the original, a replica, or variant of a charter issued to Admiral Petar Ohmućević by the Bosnian bishop and Franciscan provincial Antun Polus de Matheis (Matković) from Požega (died 1584?), at the time that the Admiral was attempting to prove his noble origin.

Petar Ohmućević tried to prove that his family's belonged to the old Bosnian nobility (before the fall of Bosnia under the Ottoman rule) so as to obtain a noble title that

1 More about the painting: I. Prijatelj Pavičić (a), 'Dva nova priloga Lovri Dobričeviću', in: *Peristil*, 34 (1991), 38–42; Đ. Vanđura, *Strossmayerova donacija. Europska umjetnost od XV. do XIX. stoljeća* (Zagreb: Hrvatska akademija znanosti i umjetnosti, 2006), 52, 558; I. Prijatelj Pavičić (b), 'Prilog poznavanju sudbine slike Uskrslog Krista i kralja Stjepana Tomaša porijeklom iz Kraljeve Sutjeske', in: *Stoljeća Kraljeve Sutjeske*. Proceedings of the symposium held in Kraljeva Sutjeska 17-18 October 2008 (Kraljeva Sutjeska–Sarajevo: Franjevačka teologija, 2010, ed. Marko Karamatić), 105-146; Lj. Dulibić, 'Lovro Dobričević, Krist i donator, 1460. (?)', in: Lj. Dulibić, I. Pasini Tržec and B. Popovčak, in: *Strossmayerova galerija starih majstora. Odabrana djela.* katalog (Zagreb: Hrvatska akademija znanosti i umjetnosti, 2013), 56–61; I. Prijatelj Pavičić (c), *U potrazi za izgubljenim slikarstvom, O majstoru Lovri iz Kotora i slikarstvu na prostoru Dubrovnika tijekom druge polovice XV. stoljeća* (Dubrovnik: Matica hrvatska – ogranak Dubrovnik, 2013), 249-259. Investigation established that the genealogy was written not on parchment, but on paper, coated with a layer of gelatine. More about the conservation-restauration work and interventions on genealogy: A. Dragoević, 'Konzervatorsko-restauratorski radovi na rodoslovlju Ohmučević', in: *Portal*, 1(2010), 109-116. The author was given copyrights for publishing the photos taken by Natalija Vasić of the painting Christ and the Donor of Lovro Dobričević and of the so-called Ohmućević genealogy, by Hrvatski restauratorski zavod Zagreb (The Croatian Conservation Institute) of Ministry of Culture of the Republic of *Croatia* (Ministarstvo kulture Republike Hrvatske).

2 After carrying out conservation and restoration, the charter was placed in a protective folder, specially designed for its safe storage, and returned to the owner, the Strossmayer's Gallery of Old Masters in Zagreb. More about the genealogy: V. Solovjev, 'Postanak ilirske heraldike i porodica Ohmučević', in: *Glasnik skopskog Naučnog društva*, XII. (1932), 79-126; I. Banac, *Grbovi biljezi identiteta* (Zagreb: Grafički zavod Hrvatske, 1991), 12–15; D. Lovrenović, 'Fojnički grbovnik, ilirska heraldika i bosansko srednjevjekovlje', in: *Bosna Franciscana* 21(2004), anno. XII., 190–192); S. Ćosić, *Ideologija rodoslovlja. Korjenić-Neoričev grbovnik iz 1595* (Dubrovnik: Zavod za povijesne znanosti u Dubrovniku, Hrvatska akademija znanosti i umjetnosti – Zagreb: Nacionalna i sveučilišna knjižnica, 2015), 15, 101–109, 111–114 (it includes previous literature). The research of the noble family Ohmučević established their presence on the territory of Hum and Dubrovnik in the 14th and 15th centuries. After the Ottoman conquest of Hum, they moved to Slano.

Fig. 2a and 2b: So-called Ohmučević genealogy (Genealogy of the Serbian and Bosnian Nobles), before and after the restoration, The Strossmayer Gallery of Old Masters, Zagreb (photo: Natalija Vasić)

was important to him as an admiral of the Spanish Armada at the time of Philip II of Spain in the so-called *classis Illyrica*. Based on the documents collected by Ohmućević, the Royal Council in Naples recognized his noble Bosnian ancestry in 1594.

It was at the time of Pope Clement VIII (1592-1605), who sought to recruit not only Catholic but also Orthodox rulers in the Ecumenical Crusade War. He was also interested in the Illyricum lands, under Ottoman rule at that time, where he found Franciscans of Bosna Srebrena among other partners. Due to his initiative in the late 16th century, the idea of linking all southern Slavs emerged in order to release them from the Ottoman administration. In the anti-Ottoman Alliance, which was then organized by the Pope, there were the Spanish and Austrian Habsburgs, the French and Polish kings, as well as the Transylvanian, Moldavian, and Wallachian Dukes.[3]

In this paper, we will examine several topics. Why were the Kraljeva Sutjeska genealogy and Dobričević's painting of Christ and the Donor/King Stjepan Tomaš (?) glued together (to form a coherent whole), in the late 16th century? Who was behind that move? Where did it happen? Where had the painting of Christ and King Stjepan Tomaš been kept until then?

Description and history of the Ohmućević Genealogy

The painting depicting the portrait of Stjepan Tomaš (?) was important to the Franciscans

3 Z. Blažević, *Ilirizam prije ilirizma* (Zagreb: Golden marketing, 2008), 157, 159, 160-161.

Fig. 3: St Jerome with his coat of arms, Korjenić-Neorić Armorial, National and University Library, Zagreb (from: I. Banac, *Grbovi biljezi identiteta* (Zagreb: Grafički zavod Hrvatske, 1991, 149))

of Bosna Srebrena, and many researchers believe that they kept it as a memory of the medieval tradition of the Bosnian Kingdom. However, how did Petar Ohmućević manage to obtain it? The Bosnian royal tradition was a crucial argument to the Franciscans in the survival of their Province of Bosna Srebrena. It was also important to the tribes and noblemen of Bosnian origin who lived at Slano, like Ohmućević.

The Sutjeska genealogy, because of the coats of arms that it contains, is a precious historical document, as according to many researchers it is "the beginning of Illyrian heraldry" (first observed by Aleksandar Solovljev). Due to the coats of arms that it contains, it is associated with the most famous Illyrian armorials with coats of arms of the so-called Illyrian families, predominantly of former noble families from Bosnia and Hum, the ones called Korjenić-Neorić, dating back to 1595 (today in the National and University Library in Zagreb), and the armorial of Fojnica, which are also related to Pedro Ohmućević and his successors.

For an understanding of the specific context of the creation of the Sutjeska genealogy, the field with a red *galero* (cardinal's cap) seems to have been important as a heraldic motif painted on the composite coat of arms on the genealogy charts of the Slavic states and kingdoms. According to historian Stjepan Ćosić, it is a question of the coat of arms of St Jerome, the patron saint of Illyria. The armorial of Korjenić-Neorić bears a depiction of St Jerome (Fig. 3) and, below it, there is a painting of his coat of arms that includes a cardinal's cap and shield with a depiction of a rampant lion. Ćosić states that this coat of arms is a modified version of a coat of arms of Slovenian March (Windischmark), known of in Habsburg heraldry.[4]

Ćosić stresses that the Sutjeska genealogy does not show the coat of arms of Serbia with the cross and tinders, like in the Korjenić-Neorić armorial. The coat of arms of Raška with three horseshoes is shown instead. Based on these two heraldic motifs, Ćosić's opinion is that the Sutjeska genealogy was made before the Korjenić-Neorić genealogy.[5]

Writing about the genealogy, historian Stjepan Ćosić directs attention to the last will of Queen Katarina (Catherine) Kosača, who (when Bosnia fell under Ottoman rule) left the Bosnian Kingdom to the Papal state. The composite coat of arms in the

4 Today, as part of the legacy of Ljudevit Gaj, it is kept at the National and University Library in Zagreb. The Korjenić-Neorić armorial was a model for several armorials, such as the Fojnica armorial in the Franciscan monastery at Fojnica, and the so-called Saraka (de Saracca) armorial (1746), today in the State Archives of Dubrovnik. Stjepan Ćosić writes that strict endogamy and the class closeness of the Dubrovnik patricians to members of navy families of Slano (originally from old Bosnian nobility), who served the Spanish and Naples courts, prevented Bosnian nobles from aquiring nobility in the Dubrovnik Republic. These were the families of Ohmučević, Dolisti-Tasovčić-Diničić, Korjenić-Neorić-Jerinić and Ursinić. Therefore, based on a variety of apocryphal and authentic stories, they sought to find their kinship with the noble elites of medieval Bosnia, Hum, Serbia and Albania. Ćosić, note 2, 15, 104.

5 Ćosić, note 2, 105.

Fig. 4: St Gregory the Great as protector of the Bosnian Kingdom, National and University Library, Zagreb (from: I. Banac, *Grbovi biljezi identiteta* (Zagreb: Grafički zavod Hrvatske, 1991, 150))

Sutjeska genealogy, which includes, from top to bottom, the historical coat of arms of the Bosnian Kingdom, the coat of arms of the Nemanjić family and the galero of St Jerome, the coat of arms of the Primorje (Littoral)/Hum/Herzegovina, is associated with the royal legitimacy of the last Bosnian King, Stjepan Tomašević (1461-1463), who was also the last Serbian ruler thanks to the marriage with Jelena (Mara), Lazar Branković's daughter (after the fall of Smederevo under the Ottoman rule) and thus also the legitimate successor of Serbian rulers from the Nemanjić dynasty.[6]

Another interesting thing for our theme is the depiction of St Gregory the Great (Pope Gregory I) at the top of the Sutjeska genealogy (above the described composite coat of arms) as the protector of the Bosnian Kingdom and the patron of the Kotromanić dynasty. (Fig. 4) In the 15th century, this saint was proclaimed protector of the Bosnian Kingdom by the Pope himself.[7]

In general, it illustrates the Bosnian-Illyrian idea and the idea of the former glory of the Bosnian Kingdom, and the noble Ohmučević family is represented as one of the important Bosnian noble families.[8]

Ćosić is of the opinion that the composite coat of arms of the Slavic states and kingdoms, with the lozenge, divided by lines of partition, of the Kosača and the Nemanjić families is the "heraldic key" for the interpretation of the symbolism of the Sutjeska genealogy for the Franciscans and the nobility of Slano, the Ohmućević family.[9]

It is worth pondering in the light of the time of its emergence, whether the interconfessional Illyrism, which is manifested in the Sutjeska genealogy and the Korjenić-Neorić armorial, is also a reflection of the political ideas of the Ohmućević family,[10] and of the then Franciscan Illyrism, and of the ideological and political "Crusading" of Popes Sixtus V (1585-1590) and Clement VIII (1592-1605) who intended to include, in the counter-Ottoman coalition, the South Slavs from the Balkan Peninsula then under the Ottoman rule.[11] Can the emergence of the galero on the depicted coat of arms be an argument for the dating of the genealogy to the time of the rule of Clement VIII, just as Don Pedro as admiral *classis Illyrica* participated in the realization of anti-Ottoman plans of the Holy League (the papal Christian Coalition)? According to historians Zrinka Blažević and

6 Ćosić, note 2, 106, 107.

7 Ćosić, note 2, 16-17.

8 'In the political-ideological articulation and distribution of the contents of the first armorial' – according to Ćosić (Ćosić, note 2, 19, 153) – 'the key role was played by Franciscans of Slano, who were connected with the Bosnian Vicary and Court of the last Bosnian kings ever since the foundation of St Jerome monastery in the beginning of the 15th century'. The Pragmatic matrix of the first armorials in the 17th and 18th centuries were used by numerous individuals and families from different parts of 'Illyria'who in the Ottoman expulsion saw the chance to grasp an opportunity and take their 'old' possessions and noble titles.

9 Ćosić, note 2, 19, 112, 117, 159.

10 Ćosić, note 2, 18-19, 27, 104-105.

11 Ćosić, note 2, 104, 117.

Stjepan Ćosić, the Korjenić-Neorić armorial dated back to 1595[12] revealed Don Pedro's position within the then anti-Ottoman plans of the Christian Coalition.[13]

Political and ecclesiastical circumstances

King Stjepan Tomaš was buried in the Church of St Michael on Bobovac in the immediate vicinity of today's monastery of Kraljeva Sutjeska. In 2010, I discussed the possibility that Dobričević's painting of Christ and the Donor could have been intended for the Church of St Michael in Bobovac. In 2015, Stjepan Ćosić also discussed this possibility.

Prijatelj Pavičić and Ćosić pointed out several possibilities: the first one is that the painting with the genealogy arrived shortly after the commission by Petar Ivelja Ohmučević.[14]

As a young researcher, I was most interested in identifying the author of the painting depicting the Dead Christ, which had been discussed for decades.[15] I linked the painting of Christ and the Donor (Christ as Man of Sorrows)[16] to the commissions that Dobričević received from the Bosnian Franciscan Vicary between 1459 and 1461. The contracts did not specify the location for which the painting was intended.[17]

In 1462, the Bosnian king Stjepan Tomaš died. His son, Stjepan Tomašević was the first Bosnian ruler crowned by the Papal crown at Jajce in 1462 (a year before the fall of Bosnia under the Ottoman rule).[18] Stjepan Ćosić explores whether Dobričević's painting of Christ and the Donor was in the possession of the Franciscan monastery of St Jerome for a time, at Slano in Dubrovnik Coastal Region (the monastery belonged to Bosnian vicary).[19]

The researchers of both artworks wonder who and why decided in the late 16th century to attach Petar Ivelja Ohmućević's genealogy with the Illyrian armorial to the back of the painting. Regarding the Bosnian king's portrait, at that moment the painting probably represented a holy relic as a memorial to the former Bosnian Kingdom. Seeking an answer to this question as well as the time at which the painting with the genealogy came to the Sutjeska monastery, prominent Croatian historian Stjepan Ćosić points out several possibilities. The first one is that the painting in the Sutjeska monastery arrived shortly after the "intervention" of Petar Ivelja Ohmućević (of course, assuming that he himself had added the genealogy to the painting) in about 1596 when "the uncles in Sutjeska got permission to rebuild the church and monastery".[20] However, the distinguished historian suggests that this may have happened later, in the late 17th or early 18th centuries. He questions if the arrival of the artwork at Kraljeva Sutjeska coincided with the time at which a variant of the armorial of the youngest lineage of the Ohmučević family arrived at the Franciscan monastery at Fojnica, known as Fojnica Armorial.[21]

Searching in this direction, Ćosić indicates the possibility that both the Fojnica Armorial and a "double relic"[22] from the Franciscan monastery at Slano could have been brought to Bosnia by two Franciscans of Bosnian Vicary: Fr. Mato Kmetović, recorded as a Fojnica guardian in 1739[23] and Fr. Ivan Kmetović, who was a Fojnica guardian a couple of years later (1741).[24] It is important to note that both of them originated from the village of Banići, which belonged to the parish town of Slano, in the Dubrovnik Coastal Area, and that both

12 Z. Blažević, note 3, 154, 157, 160-165, 170; Ćosić, note 2, 112.

13 Ćosić, note 2, 30, 46, 112.

14 Prijatelj Pavičić (b), note 1, 104-146 (it includes previous literature).

15 Prijatelj Pavičić (a), note 1, 38–42; Prijatelj Pavičić (c), note 1, 249-250 (it includes previous literature).

16 More about iconography of Christ as Man of Sorrows see: DULIBIĆ, note 1, 56–61.

17 Prijatelj Pavičić (b), note 1, 105-115, 131-135.

18 Ćosić, note 2, 111-113.

19 Ćosić, note 2, 113.

20 Ćosić, note 2, 113–117.

21 Ćosić, note 2, 113.

22 Ćosić, note 2,112–113.

23 Ćosić, note 2, 113.

24 Ćosić, note 2, 113. At that time Antun-Damjan Ohmućević (+1729) was in the Habsburgs service during the Great Turkish War. ĆOSIĆ, note 2, 159.

of them originated from the old Bosnian nobility, the family of Korjenić-Neorić. Ćosić attempts to reinforce this hypothesis by the fact that during the first half of the 18th century the two mentioned Franciscans administered three monasteries of Bosna Srebrena, those of Fojnica, Kraljeva Sutjeska, and Kreševo.

Stjepan Ćosić further explores whether the painting may have been in the possession of the Franciscan monastery of St Jerome for a while, at Slano in the Dubrovnik Coastal Area, where many members of the Ohmućević family were buried.[25] It is a question of the monastery that had belonged to Bosnian Vicary until the fall of Bosnia under the Ottoman rule, but it was located on the territory of the Dubrovnik Republic. Apart from the commissions that Dobričević did for Bosnia, Ćosić gives a particular emphasis on the painting that Dobričević was commissioned to paint in February 1460 for the main altar of the Franciscan church at Slano.[26] Unfortunately, the polyptych painted by Dobričević for the church at Slano has disappeared as well as his other paintings for Bosnian Vicary, which I mentioned earlier.[27] Does he not address the issue of whether the Franciscans could commission a painting of a Bosnian king's portrait by Dobričević for the monastery at Slano on the territory of the Dubrovnik Republic?

I suppose that historian Stjepan Ćosić offers a few interesting hypothetical answers regarding the-origin and destiny of Dobričević's painting of Christ and the Donor, and how it reached Petar Ohmučević, who was most probably the one who decided to glue the genealogy to the back of the painting.

The question of the future presentation of the painting of Christ and the Donor and of the Sutjeska genealogy in the Strossmayer Gallery: the museal challenge

Before concluding this paper, I consider it necessary to examine the situation created by the separation of Dobričević's painting and the Sutjeska genealogy. Since 2010, when the mentioned genealogy was stored in a separate folder deposited in the Strossmayer Gallery storage room (Archives of the Croatian Academy of Sciences/HAZU), i.e., it has no longer been exhibited in the Gallery.

Bishop Strossmayer (1871) promised to take care of it, but his promise has recently been "broken" by the heirs of this Collection.[28] After the restoration intervention carried out on the painting in 2006, the Ohmućević genealogy and the painting of Christ and the Donor were separated, and they no longer form a coherent whole. Therefore, in her presentation in 2017, Ljerka Dulibić pointed out the issue that arose instantly before the staff of the Strossmayer Gallery regarding their appropriate museum presentation to the visitors.

The proposal for the new appropriate museum presentation of Sutjeska genealogy to the visitors

We live in a time in which it is not simple to present the Sutjeska genealogy with the composite coat of arms of Slavic states and kingdoms. A future museum mode of presentation of the former state of the work of art, which was a coherent whole then, could explain its cultural, historical and symbolic value.

The presentation would introduce the intriguing story hidden behind the so-called Sutjeska "double relic", as Dobričević's painting with the attached Sutjeska genealogy was called.[29] When the genealogy was

25 Ćosić, note 2, 113.

26 Ćosić, note 2, 108–109.

27 Ćosić, note 2, 158-159 (it includes previous literature).

28 Bishop Strossmayer, as one of the key ideologues of Yugoslavism, included this two-piece arteork in his Zagreb collection. His Illyrian and proto-Yugoslav themes attracted researchers, historians, and heralds, who engaged in it during both the First and later the Second Yugoslavia.

29 LJ. Dulibić, 'Ikonografija Cristo passo kao nositelj ilirske heraldike', paper on the scholarly colloquia *Semantika osobne prezentacije: grbovi, insignije i portreti u ikonografiji naručitelja od 15.–18. stoljeća u Hrvatskoj*, held in the Institute of Art History (Institut za povijest umjetnosti), 6th June 2017 in Zagreb.

detached from the back of the painting, the "Bosnian relic" ceased to exist after several centuries of its strong symbolic role for the Franciscan Province of Bosnia Srebrena.

One of the contemporary museum modes of presentation of a former state of a piece of art could explain the cultural, historical, and especially symbolic value that the original work of art used to have as a coherent whole, which it was when Bishop Strossmayer borrowed it from Sutjeska friars in 1871. I am aware that we live in a time when it is not simple to present – on a large board located beside Dobričević's painting of Christ and the Donor – the Sutjeska genealogy with the composite coat of arms of Slavic kingdoms that includes the coat of arms of the Nemanjić family, without an appropriate expert explanation of the history of its significance. This is just one of the reasons that it would be necessary for today's audience of the Strossmayer Gallery to explain the time of the creation and change of the symbolism of genealogy.

According to the modern concept of the 16th century (when the Sutjeska genealogy was created), the Kingdom of Bosnia, which was then under the Ottoman rule, was the core of former Illyria. The text on the board should explain that the idea of the Bosnian kingdom was then based on the legitimacy of the son of King Stjepan Tomašević.[30] Moreover, the genealogy and the last will of Queen Katarina Kosača should not be forgotten but emphasized. In her will, the queen had given the Pope the legacy of the Bosnian kingdom because at the time after the Ottoman conquest of Bosnia it was expected from the Holy See (Lat. *Sancta Sedes*) to lead the liberation of Illyria.[31] I do hope that there will soon be a museum presentation that will include an interdisciplinary approach to the complex historical context of the creation of the painting and the genealogy, that is, to the history of this "double relic".

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30 Ćosić, note 4, 110.

31 Lovrić, 'Bosanska srednjevjekovna državnost u tradiciji Bosne Srebrene', in: *Zbornik radova sa znanstvenog skupa u povodu 500. obljetnice smrti fra Anđela Zvizdovića* (Sarajevo-Fojnica: Franjevačka teologija – Sarajevo, 2000); Ćosić, note 4, 104–107 (it includes previous literature).

Nataša Golob

THE REVERSE FACE OF THE PAINTED PAGE

Résumé

Dans les articles de recherches publiés sur ce sujet, l'enluminure est présente comme un travail accomplie, montrant une capacité esthétique et stylistique. Le verso du parchemin portant l'enluminure révèle d'autres détails, on peut voir l'effet des pigments sélectionnés sur le parchemin et le papier, ainsi que l'utilisation d'outils spécifiques et une technique particulière de travail. Un regard au recto et au verso de la page peinte nous offre des informations complémentaires plus complètes et aborde également les aspects anthropologiques du travail au Moyen Âge, qui s'appliquent à la fois aux environnements monastiques et urbains.

Keywords: illumination, reverse face, shades of colours, technical devices

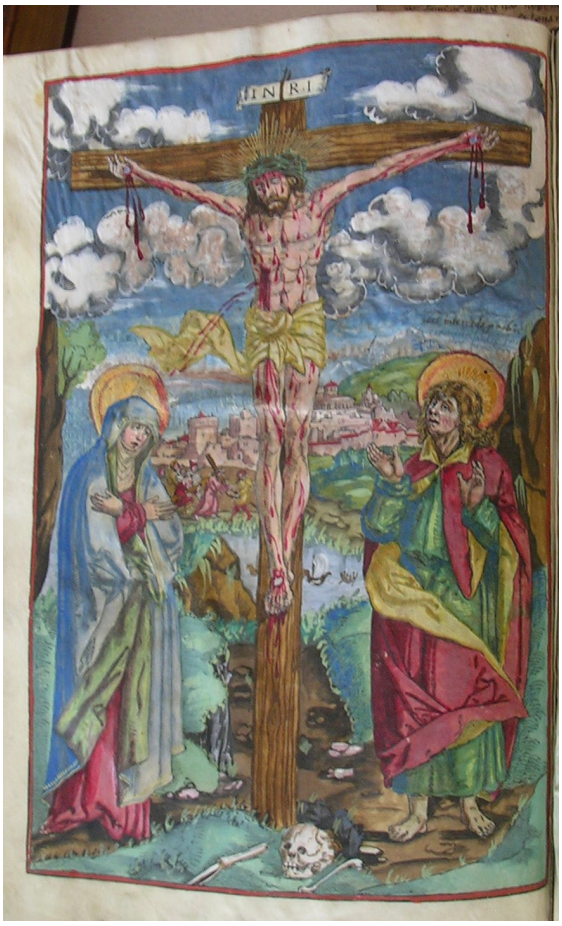
Painted page and coloured shades on the reverse side

A few years ago, I had the opportunity to admire the Missal for the Augsburg rite, printed in Dillingen in 1555.[1] It is a splendid work, and as tradition demands, the canon leaves are printed on parchment, opening with the Crucifixion (Figs. 1a, 1b) The expressive power of lines on the woodcut, made by Matthias Gerung, was intensified by layers of paint and the enhancement of some details, such as streams of blood on Christ's body. The colourist that complemented the image of this tragedy used gold and dense layers of colours. Due to the demands of the printing process, the parchment is stiff and flat; despite its relative thickness, all painted segments left a coloured shade on the reverse side of the folio, regardless of whether they were bright or dark.

Because the colouristic character of Gerung's Crucifixion is so impressive, I compared the composition with two other examples, also individually coloured. Identical compositions gain an essentially different character due to the choice of colours. Obviously, the pallet is influencing the expressiveness, giving more weight to the content, enhancing the religious message, and intensifying iconographic accents. Comparative Missals[2] from the same print run and embellished with colours by other illuminators are also exceptional works, but it seems that the colourists used relatively light colours, and

1 *Missale secundum ritum Augustensis ecclesie*, Dillingen: Sebald Mayer 1555. Ca. 355 × 245 mm; five woodcuts of higher importance, among them the Crucifiction, were commisioned to Matthias Gerung by the Cardinal Prince Bishop Otto Truchsess von Waldburg.

2 Christie's sale 5960; auction catalogue, 21st November 2012, lot 116; Augsburg, Staats- und Stadtbibliothek, MF Th A 498 – 1555b.



Figs. 1a–1b: Maribor, Archbishopric Archives, R 25: *Missale secundum ritum Augustensis ecclesie*, Dillingen: Sebald Mayer 1555, Crucifixion and reverse side of the composition

they do not exceed the necessity of covering the surface of the woodcut. Thus, only the illusion of this event was created and altogether the level of selective realism is not surpassed. One may expect that they complied with the wishes of commissioners, but they also did not take a step away from the average colour scheme to immerse themselves in the essence of the woodcut. This simple comparison illustrates well the essence of the colour, also marking the potent expression of line and of colour.

Here is the question: did illuminators or manuscript workers in a broader sense know the weight that layers of paint carry over the aesthetic quality of the subordinated, i.e., reverse side of the folio, which touches on the working process, composition, and quality of the substances used for painting?

This is related to another issue: when did the coloured shades on the reverse sides emerge? Is it possible that they were already visible during the process of illuminating? Would it be possible that they were annoying to the eyes of the illuminator, the commissioner, and the first owner at this early stage? Did the coloured shades cause unpleasant feelings, because they are blurring the page, and are influencing the legibility of the text? One could say that they are causing aesthetic damage. At least from our perspective, it seems logical – if the shades appeared instantly – to move the intended composition on the reverse side from one part of the folio to another section, especially at the instances when there was no shortage of the surface.[3] Regarding the pres-

3 More attention was paid to manuscripts from Carolingian age until the end of the Romanesque; the impression that damage on the reverse side of the folio appeared only after several decades is sustained by several examples; even excellent illuminators did not choose for their compositions a non-affected place; therefore, it seems that during their work the damaging effects did not appear. Such case is the illumination of the so-called

ervation of medieval and renaissance illuminated manuscripts, a dilemma remains: did the processes slow down after a period of severe deterioration and not progress any further, or did this process ever stop at all?

As an art historian, I am familiar with many a manuscript and have long known that some of them are in poor condition and that this was caused by applying various damaging substances. Sometimes, after several controls, we ascertained the signs of deterioration and realized that some processes could not be stopped. That caused the inaccessibility for research of a number of famous manuscripts; some, like the Giant Admont Bible, were victims of unusual chemical components, like the mixture of silver and gold dust with pigments.[4] Also severely damaged is the group of so-called "black manuscripts" for the Burgundian court of the second half of the 15th century. As is clear now, the advancing of deterioration due to using inappropriate material is revealed after several centuries. The creators of these magnificent codices could not have known that by choosing particular substances, they condemned to death their most beautiful works of art.

There is no answer suitable for all manuscripts; every item requires individual analysis (this is in the domain of natural sciences), and there are three classes of materials that are specific and unique for every manuscript: a) a variety of parchments and substances used for their fabrication; b) a variety of pigments and their additives; c) a variety of layers, grounds, necessary for the decoration. These three components contributed to the final result and the subsequent life of the manuscript. It is not news that an average atelier had a selection of pigments at their disposal, which, at least to the naked eye, could in different combinations produce the same hue of colour, and subsequently contribute to an aesthetic whole. Only modern technology can give an answer to which pigments they used when, for example, blue was needed for various elements, but it is not unusual for us to be able to detect the differences in chemical composition from the shades on the reverse side of the painted detail easily with the naked eye.[5]

Many manuscripts are worthy of particular interest because of the process of the ageing of the painted layers, which influenced the final aesthetic and iconographic result. As an intriguing example, I choose the so-called *De Fay Gospels*.[6] This Carolingian manuscript was produced in the world-renowned scriptorium of St Martin at Tours

Odbert Gospels, copied and illuminated in the abbey of Saint Omer, early 11th century, now New York, Pierpont Morgan Library, Ms M 333. On fol. 84r is depicted Saint John, his bank has a rim in malachite green rim; on the reverse side, fol. 84r is below the capitularium *Expliciunt breves causae* painted a dedicatory picture, showing the tonsured Odbert and a fellow monk presenting books to Saint Bertin, their hands covered respectfully in the presence of the holy founder of their monastic community. The composition of Saint John in elaborate drawn frame is visible as a shade also on fol. 84r, yet not causing an un-aesthetic result. Disturbing are only traces of green fields, crossing the dedicatory composition. – I presume that the illuminator handed out a perfect codex, with no disturbing shades. For the manuscript cf. R. Kahsnitz, 'Der christologische Zyklus im Odbert-Psalter', in: *Zeitschrift für Kunstgeschichte*, 51/1988, 33-125; E. Williams, [16] Odbert Gospels', in: *Pen and Parchment. Drawing in the Middle Ages*, ed. By M. Holcomb, <The Metropolitan Museum of Arts, June 2nd – August 23rd 2009> (New Haven and London, Yale University Press, 2009), 74–76.

4 A. Fingernagel, *Die Admonter Riesenbibel (Wien, ÖNB, Cod. Ser. n. 2701 und 2702)*, (Graz: Akademische Druck- u. Verlagsanstalt, 2001), 19.

5 The analysis of the *Book of Hours of Catherine of Cleves*, now New York, Morgan Library & Museum, MS M. 917 and M. 945, ca. 1445, showed that several illuminators worked by the side of Master of Catherine of Cleves. Different hands are underlined also by the use of pigments and various kinetics of the hands. F. Trujillo, 'From the master's hand? A study of working methods of the Master of Catherine of Cleves', in: *Care and Conservation of manuscripts. 13. Proceedings of the fifteenth Seminar held at the University of Copenhagen, 13th – 15th April 2011*, Copenhagen 2016, 451–472. Similar results are also quoted by other studies because of the importance of the workshop(s), involved in the illumination of the *Visconti Book of Hours*, cf.: C. Rob-Santer, 'Die Trecento-Ausstattung des Visconti-Stundenbuches – Ein Werkstattbericht', in: *Wege zum illuminierten Buch. Herstellungsbedingungen für Buchmalerei in Mittelalter und früher Neuzeit*, (ed. by C. Beier und E. T. Kubina), (Wien, Köln, Weimar: Böhlau Verlag, 2014), 125–147; as a technical detail, worth mentioning regarding the technique of painting, being so delicate that at some instances the underdrawing is shining through the layers of paint (p. 134), the analysis also showed that several painters used pigments of different compositions (p. 144).

6 https:// gallica.bnf.fr/ark:/12148/btv1b8426037h [accessed May, 30, 2019].

Figs. 2a–2b: Paris, National Library of France, Ms lat. 9385: *Evangiles dits De Fay*, 18r–18v, Tours, 845–851

(Figs. 2a, 2b). A glance through the pages of this perfectly preserved manuscript alerts us that its pages are no longer offering the same aesthetic that they had at the moment of their creation. The purple areas, the letters and rims in gold, half-palmettes in orange and red, folded green ribbon, and other features that are preserved on the front page and on its reverse side are in substantially the same level of quality as in the mid-9th century; their intensity of colour did not change over the years. The original colour character is well preserved when supported by golden ink.

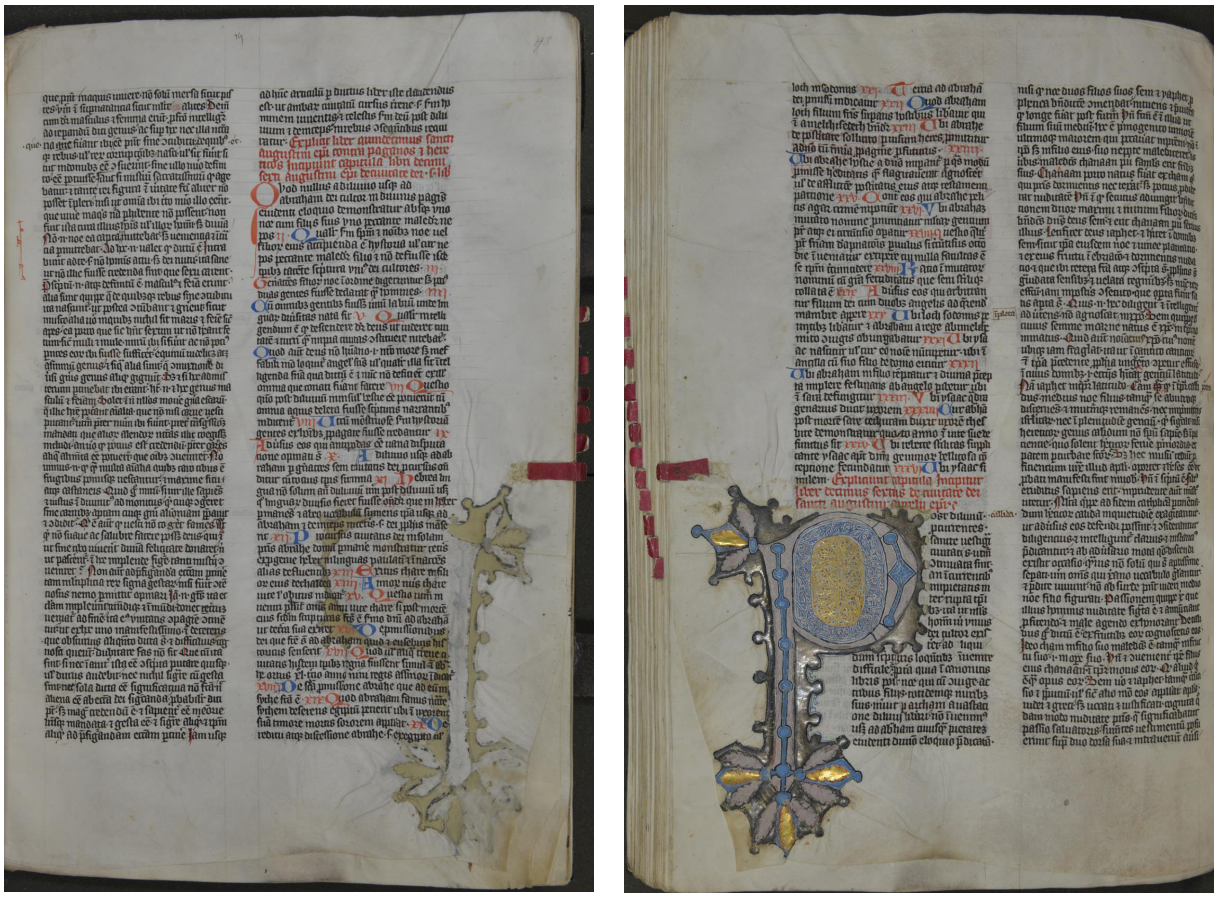
In contrast, the pictorial essence of the parts where silver ink was applied has changed significantly: on the front page, the silver ink turned almost completely black, on the reverse side, there are dark grey shades. There are several opening pages for each Gospel, where silver ink has lost its brilliance and is immersed in the surrounding purple; hence, the most important introductory words became illegible. It is well known that during the Carolingian and Ottonian era many experiments regarding pigments were executed, and cheaper silver was mixed in the gold base,[7] yet only chemical and physical analyses would yield exact answers regarding the composition and percentage of ingredients.[8]

It is presumably the process of ageing that transformed layers of silver leaves and lines of silver ink on the dark surface and left distinctive shades: if the transformation from glittering into dark grey had been immediate, the decisions for quantities of silver accents would have been accepted with much more precaution. Many illuminated works suffered aesthetic changes because of dark silver surfaces.[9] The quality and shine

7 C. Denoël, 'Sur les traces d'un livre d'évangiles du XIe siècle provenant de la Bibliothèque d'Antoine Loisel (Paris, BNF, Latin 17228)', v: *Revue Mabillon*, n.t., t. 17(= t. 78), 2006, 35–52, cf. 40.

8 Denoël (note 7) refers to the investigations of pigments, used in the Fleury abbey. She concludes that during the pre-Romanesque era, scriptoria in less wealthy monasteries used mixtures of silver and gold pigments. Her information does not include whether is this statement valid for manuscripts, commissioned from the part of richer aristocracy, or for the ones intended for free market.

9 Often we read remarks, saying: "silver leaf, which has now almost completely turned black, must have originally enhanced the glittering of the illuminations." Cf. L. Watteeuw & M. Van Bos, '»*Un tres beau psaultier, tout escript de lettre d'or et d'azur*«: History, imaging and analyses of the Peterborough Psalter (Brussels, KBR 9961 –



Figs. 3a–3b: Ljubljana, National and University Library, Ms 2: Aurelius Augustinus: *De Civitate Dei*, 98r–98v, Charterhouse Bistra, 1347

of silver and gold on the front side often have a counterpart on the reverse side, with dark areas and wrinkling, but they are also dependent on the grounds used. Recent developments in 3D microscopy and 3D imaging with Photometric Stereo are providing insight into the topography of art materials. The process of Reflection Transformation Imaging can provide new insights into the study of illumination, especially in techniques, showing changes in more or less concave surfaces. It is a very useful tool for the identification of techniques applied in the creation of gilded letters, parts of initials, backgrounds and similar features, showing cracking, flaking of metal surfaces, and other forms of deterioration.[10] We are well aware of the fact that dark spots on the reverse of the parchment may be caused by the selection of ground, either usual gesso, coloured gesso, Armenian bole, or a base containing mercury.[11] The final decision, for example, to use raised grey gesso, or a raised vermillion layer, was the personal decision of the illuminator (Figs. 3a, 3b). His decision influenced different hues in metallic leaves. Cennino Cennini, who dedicated so many chapters of his *Il libro dell'arte* to gold backgrounds on parchment (Cap. CLVII–CLXI), does not utter a single word about possible influences to the reverse side, but one must admit that there were so many techniques of painting and so many substances that obviously a painter was necessarily a practical chemist, and the results of his work were sometimes unpredictable.[12]

9962)', in: *Care and Conservation of manuscripts. 15. Proceedings of the fifteenth Seminar held at the University of Copenhagen, 2nd – 4th April 2014*, Copenhagen 2016, 269–285, cf. 283.

10 Watteeuw & Van Bos, note 9, 274–277.

11 Watteeuw & Van Bos, note 9, 280.

12 The magic of glittering segments in silver and gold and multi-coloured initials is not related only to the direct worship of precious materials, more important is allegoric and theological determinant in the character of

There are no art historical publications on the aspects of the reverse face of the parchment; also specialized catalogues and studies hardly ever offer a reproduction of both sides. I understand that the folio, showing "damages" of colour hues are not interesting from the point of view of aesthetics and that studies are concentrated on the importance of illumination in a proper sense of the word. Publications display attention for the creative force of the painter, for artistic achievement which is a feast for the eyes, and for iconographic importance. The fact is that reproductions of the reverse side are often crucial for offering complementary information, which is based on a possibility of following the working process and material properties in a specific time and in a specific milieu. In this respect, the digital views of entire manuscripts are outstanding support for research, as we have access to the reproduction of the front and reverse faces. Indeed, nothing can be a complete substitute for viewing the original, but it provides a lead.

Mediaeval manuscript workers were aware of the importance of using quality parchment folios and pigments. Some of their decisions, which we can rarely trace, are evidence of their awareness of material limits. Frank M. Bischoff demonstrated the thought and deliberation that went into the choice of parchments by copyists and illuminators, working on the *Gospels for Henry the Lion* (ca. 1188).[13] For folios for which illumination dominated, they chose calf parchment, which is thick and quite bright, while for prevalently textual pages they used sheep parchment, which is slightly thinner and yellowish.[14] The master illuminator carefully oversaw the accurate positioning of painted surfaces on both faces of the folios and thus avoided the majority of shadowy traces. Despite the fact that calf parchment bears the applications of strong colours well, not all differences were avoidable. For iconographic reasons, there are four medallions on the corners of the composition of *Ancestors of Jesus*:[15] on the other side, where the dedicatory image is painted, we can notice their shadowy shapes, but because of the compactness of the parchment they are not a disturbance.[16]

It was a general rule that for liturgical manuscripts parchments of good quality were available; consequently, painted initials with decorative branches of leaves and blossoms were set in the proper place within the text, or on margins without disturbing the text on the reverse face. Sometimes the decision was made that floral borders on the recto and verso were to be identical, being traced through. The reason might be twofold: with this ingenious method, they saved time and possibly avoided the bleed-through of paint from the other side of the leaf.[17]

The case of manuscripts with particularly thin parchment is another story. An example is *Summa Monaldina*, made in the milieu of Paris University around 1300. The thin parchment caused a particular comprehension of the "reverse face" and of the role of drawings on the recto and verso sides of each leaf. There are approximately 1600 autonomous drawings on the margins, shining through the folio and thus enjoying a double life: on the upper side, in their complete and clear form, and on the reverse side, as a soft

mediaeval art. Though allegorical and exegetical interpretations of colour and light were in the domain of the learned ones, consecrated in the meanings of the Christian iconology, the delight in admiring the glittering and colourful works of art, available on public spaces to everyone, was not curtailed. Cf. R. Assunto, *Die Theorie des Schönen im Mittelalter*[2] (Köln: Du Mont, 1982), 63.

13 Wolfenbüttel, Herzog August Bibliothek, Cod. Guelf. 105 Noviss. 2^0 resp. München, Bayerische Staatsbibliothek, Clm 30055.

14 F. M. Bischoff, 'Pergamentdicke und Lagenordnung. Beobachtungen zur Herstellungstechnik Helmarshausner Evangeliare des 11. und 12. Jahrhunderts', in: *Das Pergament. Geschichte, Struktur, Restaurierung, Herstellung*, ed. by P. Rück (Sigmaringen: Thorbecke Verlag, 1991), 97 – 144, cf. 134 ss.

15 On the upper corners are medallions of Christ as *Sponsus* and Maria as *Sponsa*, persons from the Song of Songs, here related to the images of Henry the Lion and his wife, Mathilde; in medallions on the bottom corners are depictions of Jeremiah and St Paul.

16 E. Klemm, *Das Evangeliar Heinrichs des Löwen* (Frankfurt am Main, Insel-Verlag, 1988), pl. 5 and 6.

17 J. J. G. Alexander, *Medieval Illuminators and Their Methods of Work* (New Haven and London, Yale University Press, 1992), 49, note 79.

shadow. These marginal drawings are not a jolly decoration, or a pictorial whim devoid of content, but are painted key-words and a help to the reader looking for a definition in the legal encyclopaedia. The choice of a nearly transparent parchment is above all information on praxis in a workshop.[18]

Painted page and traces of technical devices on the reverse side

The presence of the painter's line and his creative intention also offer a view from another angle – underdrawings and sketches rarely leave evidence on the reverse face, but the presence of technical devices can also be discovered through their traces. Illuminators made use of them when a drawing of a form or of a whole composition was needed at short notice and in an acceptable quality. It was often just a repetition of more or less common forms, already used and now reused in a new scenery or iconographic context. The use of technical devices is evidenced by mechanical traces: it is not unusual that in a manuscript workshop the evidence of stencils, cartoons, pouncing, ways of transferring the model, and similar were "softened" or erased after the work was finished. Still, many traces remained, and it seems that back then, in the Middle Ages, their presence from an aesthetic point of view was not questionable. Many of these devices (patterns, stencils, templates, etc.) originated most probably from various projects of the past, and this reuse might explain the peculiarities in the dimensions of forms. The choices illuminators made were also prescribed by the physical factors of materials, the decisions of the scribes regarding the remaining space left to the illuminator before he could set to work, and other factors.

Early stages in the research of these working methods have been documented in the catalogues of manuscript illumination from the 19th century, when techniques of illumination displayed by unfinished manuscripts were set under the magnifying glass; also mentioned were underdrawings, autonomous drawings, sketches, forms, outlined with pouncing, impressed outlines, shades of pressed forms, etc. Numerous notes and also speculations on the nature of these technical devices received a fine and thorough overview in the monographs of J.J.G. Alexander on the working methods of medieval illuminators and Robert W. Scheller's monograph on model-book drawings. They signified the essence of this field and turned attention to the importance of preserved documents of pictorial praxis in the Middle Ages and Renaissance.[19] It is worth emphasizing that the insight in the medieval workshop practice elucidated on one side the role of commissioner, the creator of an iconographic programme, the illuminator with several helping hands, and on the other the importance and availability of models, in particular, examples for isolated forms or complete compositions. At some instances, attentive research documented the transfer of compositions into various techniques.[20] To properly set up mediaeval techniques of copying and multiplying in the real rhythm of the past, the data reveals their understanding of authorship. In these societies, the open appropriation of forms and ideas, of copying, and similar was often just a social practice but also occurred due to

18 N. Golob, Painted Key-Words: 'Accessing Contents by Images', in: *Change in Medieval and Renaissance Scripts and Manuscripts* (Proceedings of the 19th Colloquium of the Comité international de paléographie latine: Berlin, 16–18 September, 2015, ed. by M. Schubert and E. Overgaauw; *Bibliologia*, 50, 2019), 137–149, notes on relation between parchment and marginal drawings on pp. 140–141.

19 Alexander (note 17); R. W. Scheller, *Exemplum. Model-Book Drawings and the Practice of Artistic Transmission in the Middle Ages (ca. 900 – ca. 1470)*, (Amsterdam: Amsterdam University Press, 1995).

20 B. Cardon, 'Rogier van der Weyden and the Master of Amiens 200 concerning the Relationship between panelpainting and bookillustration', in: *Dessin sous-jacent dans la peinture. Colloque VIII, 8–10 septembre 1989,* ed. by H. Verougstraete-Marcq et R. Van Schoute, Louvain-la-Neuve 1991, 43–53. On p. 43, he explicitly presents the point of research, namely the impact of South Netherlandish (panel) painters on manuscript illumination. But: the nature of dependance between techniques of painting requests accurate analysis and generalization is not appropriate postion, though the author admits that numerous works of art have disappeared.

necessity, when several artists were in a situation to form a collaborative group in order to accept a larger commission. Circumstances in vibrant towns created the atmosphere in which ideas and stylistic differences in works of individual authors contributed to art, acceptable for all. They attained *varietà,* an artisanal excellency, and were praised for it, but in reality, only fantasy, novelty was appreciated, namely *ingenio*.[21]

Medieval vocabulary regarding the technical aids and processes of their use is quite differentiated, reaching from poetical and philosophical evaluations of the creative process to very practical descriptions.[22] Skilled labour, concentrated on repetitive patterns, remained appreciated in the following centuries;[23] it was prevalently limited to decorative frames on paintings of larger dimensions, no more for compositions in illuminated manuscripts and books. On a wall painting or on panel painting, one can see a line of dots, connected with a line only on one surface, while on parchment folio the prickings are also visible on reverse sides. I trust the statement that there are no written texts from the Middle Ages[24] with preserved and detailed instructions remaining, and all information is derived from the inspection of manuscripts, meaning that particular gestures or specific details repeated and in a manuscript are evidence of the use of technical devices, which the master illuminator and his helpers had available. Moreover, they are not rare.[25]

The character of pricks with regard to their traces cannot escape an attentive eye: prickings reveal when a certain image was created in respect to the manuscript. In *Graduale*, possibly from ca. 1400,[26] the composition of the initial was inked over the pattern of pricking on the front side and so the "blind perforated image" received a formal and iconographic character. Pricks are also visible on the reverse side and, by their nature, we can claim that the needle perforated the parchment only after the musical notation and texts were already written on the reverse face of the folio.

For initials and other compositions, pouncing must have been executed freehand and not with a pouncing wheel.[27] However, traces of this procedure would not be preserved in two major cases: if the pouncing were performed before the text was also written on the reverse side, pricks would interfere with the line of writing but they would not be preserved in case there was an intention to finish the pounced image; the pricks would be evened out to prevent the leaking of the paint through to the other side.

In some particular manuscripts, not all of the initials were designed by the same method of pricking around the model, as several initials show the underdrawings in brown ink. However, it is not unusual to see various techniques in just one codex (Figs. 4a, 4b). Such is the manuscript containing Ulrich von Pottenstein's *Das Buch der natürlichen Weisheit*,[28] once kept in the library of

21 W.-D. Löhr und S. Weppelmann, '»Glieder in der Kunst der Malerei« - Cennino Cenninis Genealogie und die Suche nach Kontinuität zwischen Handwerktradition, Werkstattpraxis und Historiographie', 13-43, in: *Fantasie und Handwerk. Cennino Cennini und die Tradition der toskanischen Malerei von Giotto bis Lorenzo Monaco,* ed. by W.-D. Löhr und S. Weppelmann, <Gemäldegalerie Staatliche Museen zu Berlin, 10. januar bis 13. april 2008> (München: Hirmer 2008), cf. 28.

22 Italian artistic literature assembled words like *carta lucida* (transparent paper), *straforo* (perforated templates), *spolvero* (outlined form, obtained by pricking), *calco* (tracing the cartoon onto surface with stylus) etc. Cf. Löhr und Weppelmann (note 21), 33 and footnote 163.

23 Scheller (note 19), 70–77; C. C. Bambach, *Drawing and Painting in the Italian Renaissance Workshop. Theory and Practice 1300–1600* (Cambridge, Cambridge University Press, 1999).

24 S.a., 'Vorwort', in: *Wege zum illuminierten Buch* (note 5), 7–9, spec. 8.

25 J. K. Eberlein, 'Das Perikopenbuch Heinrich II. (clm 4452) – Ein Blick auf die Herstellungsweise der Miniaturen', in: *Wege zum illuminierten Buch* (note 5), 10–25.

26 The manuscript in question is *Graduale*, Novo mesto, Franciscan monastery, Aa-1.

27 This is evidenced by diverse intervals between pricks; when using the pouncing wheel, the intervals are always equal. Cf. also J. A. Dane, 'On the shadowy existence of the Medieval Pricking Wheel', in: *Scriptorium*, L, 1966/1, 13–21.

28 Now: New Haven, Yale University, Beinecke Rare Book and Manuscript Library, Ms 653, after the mid-15th century; L. Fagin Davis, 'An Austrian Bibliophile of the Seventeenth Century: Wolfgang Engelbert von

Figs. 4a–4b: Yale University, The Beinecke Rare Book and Manuscript Library, Ms 653: Ulrich von Pottenstein: *Das Buch der natürlichen Weisheit*, 210r–210v, south German workshop

Prince Wolfgang Engelbert von Auersperg in his Ljubljana palace.

Sixty images[29] display a wide range of technical devices; some objects were prepared for the colourist as simple repetitions of outlined stencils and forms with pricked outlines (trees, sun, moon, mountain, fox, wolf, spider, ox (which is sometimes also horse, depending on the shape of the tail), lion (with a humanized head), rooster, etc.). In this workshop, graphic sheets were also available,[30] and it is witnessed by a sitting bear, or an ape with crossed legs, also found in other contemporary books with illumination or woodcut decoration. There are many images of animals, but they do not fit in the same standard of sizes. Several animals are often repeated but in constant dimensions: there is always a hedgehog of the same size, a fox that is not bigger than a hedgehog, always a rather big peacock, and so on. All this indicates that in this particular workshop, models, templates, and stencils were extensively used. Also, a crow is not always a crow but also an eagle, outlined with the halo of a model and painted black. Roe and roe-buck were formed with the help of two different

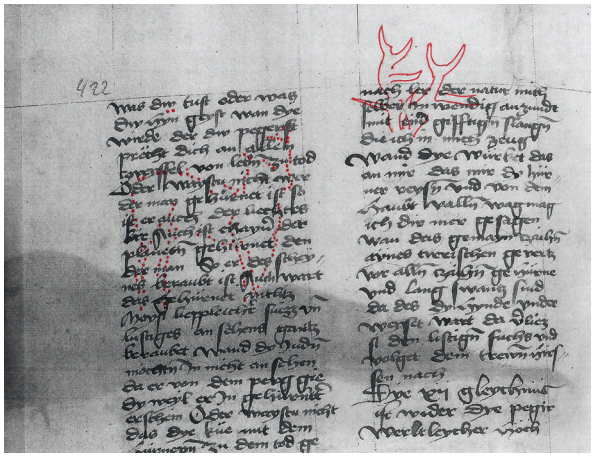


Fig. 4c: Drawings of perforations and outlines with a stylus.

devices: the outline of the roe-buck was made either by the method of tracing over transparent vellum or paper, but it is possible that this particular shape was cut from a harder material (like stiff parchment), and was outlined with a stylus, or quill, or silverpoint. These traces are hardly visible on the front side; the lines are blurred by repeated outlines and watercolours, yet we feel them under the fingers on the reverse face and, with the help of light and shadow, we see them as a relief. The outline of a roe was instead made with perforations along the contours of the model. Here again, the traces are visible on the reverse side. This workshop extensively used one model for peacocks, sometimes turned to the left and sometimes to the right. Not all steps in illumination

Auersperg, Count of the Holy Roman Empire', in: *Codices manuscripti*, 30/2000, 3–17. I. Mueller, 'The Illustrations of Cyrill's fables from Ms 653', in: *Codices manuscripti*, 30/2000, 19–26.

29 Manuscript is digitized: https://brbl-dl.library.yale.edu/vufind/Record/3566746

30 Scheller, note 19, 76 on importance of graphic sheets and drawn model books.

can be explained: on 227v is a peacock in his usual form, and the relief on 227v is enhanced with red ink. Yet always, regardless of the entirety of the composition, the peacock is of identical dimensions.

These illustrations are not of impressive quality, and it seems to be the logical conclusion that they were produced in a workshop where a swift tempo was demanded. The manuscript was not particularly expensive and was intended for a clientele hungry for text and capable of adding proper images to the texts from their own fantasy. The workshop and such results would not require attention to quality, unless this manuscript shows that both sides of illustrations form complementary information. In this particular case, the reverse side of the paper is an important transmitter of insights into the working process. Like sculptures, ivory plaques, paintings, and similar, the hidden side is hiding surprising evidence, and traces of working processes are telling a story of its own in the story of the work of art.[31]

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31 M. Budny, 'Assembly Marks in the Vivian Bible and Scribal, Editorial, and Organizational Marks in Medieval Books', in: *Making of the Medieval Manuscript: Techniques of Production*, ed. by L. L. Brownrigg (Los Altos Hills – London: The Red Gull Press, 1995), 199–246.

Joris Corin Heyder

PASTICHE AESTHETIC. A FORGER'S OR A RESTORER'S PRACTICE?

Zusammenfassung

Woran lässt sich erkennen, ob es sich bei einer Handschrift um eine „Fälschung" oder aber um eine restauratorische Maßnahme des 19. Jahrhundert handelt? Der Beitrag versucht dieser Frage anhand eines heute nahezu unbekannten Kodex des Baltimore Art Museums (Walters 436) auf den Grund zu gehen, der seit Randall (1997) als eine Arbeit aus dem Umkreis des flämischen Buchmalers Simon Bening gilt. In drei Abschnitten wird zunächst der ungewöhnliche materielle Bestand des Gebetbuchs erschlossen, bei dem es sich um einen Zusammenschluss aus diversen Gebets- und Stundenbüchern des 15. und 16. Jahrhunderts handelt. Sodann werden Personen wie der Pariser Buchbinder Capé in den Blick genommen, die aller Wahrscheinlichkeit nach mit der aktuellen Gestalt des Buches in Verbindung gebracht werden können und schließlich die am Beispiel des Gebetbuchs Walters 436 zu beobachtenden Praktiken zeithistorisch kontextualisiert.

Keywords: Forgery, Restoration, Simon Bening, Flemish Illuminated Manuscripts, Bookbinder Charles-François Capé

Introductory remarks

While studying medieval manuscripts, one occasionally stumbles upon those volumes that are bound together from various manuscripts. These miscellany codices have a long tradition in the history of books.[1] Prior to the modern era, they were an effective way of keeping the costs of binding limited, and to collect, for example, texts by different authors referring to the same subject. Manuscripts related to this group are those that are bound and glued together from various medieval manuscripts but shall represent, unlike the first group, one single, intact codex. This barely studied group of manuscripts had its heyday in the 19th century and doubtlessly resulted from two central aspects: first, the booming art market, and, second, the 19th-century revival of medieval art in general and the consequences for contemporary art and design connected with it.[2] Therefore, it is often difficult to say,

1 S. Westphal, 'Sammelhandschrift', in: *Medieval Germany. An Encyclopedia*, ed. by J. M. Jeep (New York – London: Routledge 2001), 691–694.

2 Since the literature on the gothic revival is too rich to be summarized, I would like to mention only some relevant monographs and multi-authored works, cf. E. Cau, *Le style troubadour: l'autre romantisme*, (Montreuil:

whether the "re-invention" of a medieval manuscript from different bits and pieces was done by a forger or a restorer.

This paper aims to reconstruct the history of a barely known prayer book (W.436)[3] in the Walters Art Museum in Baltimore that was attributed to the circle of Simon Bening (c. 1483–1561) by Lilian Randall in 1997,[4] but which instead appears to be a 19th century product made from dismembered parts of 15th and early 16th centuries books of hours from Flanders and maybe Holland. Arguments for this hypothesis will be presented based on material observations. They trace the compilator's effort to merge different fragments by using unifying miniatures and decoration as well as the astonishing negligence of contents and different styles that were put together. The focus will be on the person who perhaps stood behind the amalgamation of Walters 436. Whether the manuscript's pastiche aesthetic is the result of a forger's wit or the effort of a restorer may be tackled by contextualizing the manuscript within the 19th century art market and its specific taste for medieval illuminations, for instance those created by the famous art forger William Caleb Wing (1801–1875), or the occurrence of journals like the *Coloriste enluminure*.[5]

Materiality: A barely studied Flemish prayer book in Baltimore (W.436)

In an undated letter probably written before 1969 by the then young expert of late Flemish manuscripts Alfons Biermann (1935–2014) and addressed to Dorothy Miner (1936–2008), who at the time was the curator of the manuscripts department at the Walters Art Gallery, the here-discussed prayer book's unresolved status becomes quite clear. He wrote: "[…] I am very interested to see the photographs of the MS. W.436, because they will be very important for my thesis in connection with the Bening works […]."[6]

Biermann asked Miner for photographs of a prayer book of c. 1500 that had been almost unknown until then. It has only occasionally been mentioned in the literature and was assumed to be the work of the Flemish miniaturist Lievine Bening (c. 1510–1576), who is better known as an English court painter of three kings and queens and under the name Lievine Teerlinc, using her husband's surname.[7] Lievine was the daughter of Simon Bening, who, nowadays, is still revered as one of the most sought after miniaturists of late medieval art on parchment.[8] It is unclear who first proposed the manuscript's attribution to Lievine; however, her oeuvre remains unknown because there is not one single work that can be attributed to her with some degree of certainty.[9] Biermann had no good reason to doubt such an attribution to Lievine, since the manuscript

Gourcuff Gradenigo, 2017). *Gothic Revival Worldwide: A.W.N. Pugin's Global Influence*, ed. by T. Brittain-Catlin, J. De Maeyer, and M. Bressani (Louvain: Leuven University Press, 2016). *The Revival of Medieval Illumination: Nineteenth-Century Belgium Manuscripts and Illuminations from a European Perspective = Renaissance de L'enluminure médiévale: Manuscripts et enluminures belges du XIXe siècle et leur contexte européen*, ed. by T. Coomans and J. DeMaeyer (Louvain: Leuven university press, 2007). C. Amalvi, *Le Goût du moyen âge* (Paris: Plon, 1996).

3 Baltimore, Walters Art Museum, Ms. W.436, i+95+bis+i sheets of parchment, 99 × 151 mm, c. 1470, c. 1500 and c. 1850(?). The digitized manuscript can be found here: http://purl.thewalters.org/art/W.436/description [last access: 4.11.2019]

4 L. M. C. Randall, *Medieval and renaissance manuscripts in the Walters Art Gallery. Belgium, 1250–1530*. (Baltimore: The Johns Hopkins University Press, 1998), vol. 3.2, cat. 295, 509–521.

5 A digitized version *of Le Coloriste enlumineur : journal d'enseignement du dessin, de la miniature, des émaux, de l'aquarelle, de la peinture sur verre, sur soie, etc.. : à l'usage des amateurs et professionnels* can be found here: https://gallica.bnf.fr/ark:/12148/bpt6k898710h [last access: 4.11.2019].

6 The letter is preserved in the files of Ms. W.436 in the manuscripts department of the Baltimore Art Museum. The item has no individual shelf number. I am very grateful to Lynley Herbert, curator of Manuscripts & Rare Books, who kindly gave me the opportunity to carefully study some of the treasures of the Walters Art Museum.

7 C. Levin, *Extraordinary women of the Medieval and Renaissance world: a biographical dictionary* (Westport, Conn.: Greenwood Press, 2000), 278–280.

8 The first comprehensive monograph on the illuminator has recently been presented by: J.C. Heyder, Simon Bening und die Kunst der Wiederholung (forthcoming).

9 *Illuminating the Renaissance: The Triumph of Flemish Manuscript Painting in Europe*. London, ed. by T. Kren, S. McKendrick, and M.W. Ainsworth (Los Angeles: Getty Publications, 2003), 22, 37, 412, 447–448.

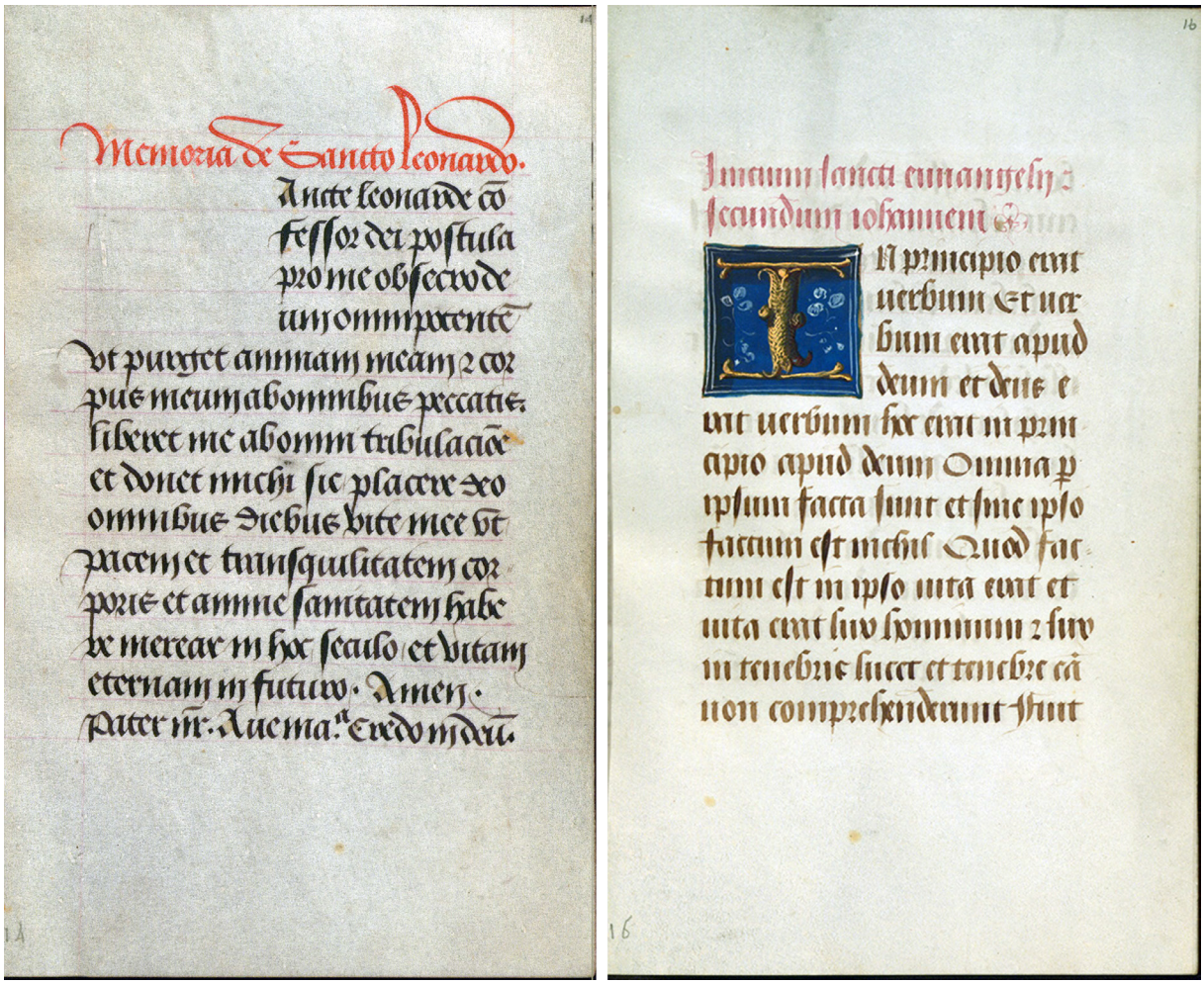

Fig. 1: Baltimore, Walters Art Museum, Ms. W.436, fol. 14, 16, c. 1500 © Walters Art Museum

could be another example of one that was created in the prolific workshop in which he was actually interested.

Going beyond the brief entry in the census of De Ricci,[10] Lilian Randall presented a far-reaching note in her catalogue on the collection of the Walters Art Museum, comprising no less than thirteen closely-printed quarto pages including a meticulous description of the manuscript.[11] Based on Randall's entry, it is difficult to understand the manuscript's complex structure. While Randall attempted to explain the different parts of the codex by hypothesizing different writers and painters that worked more or less in the same period, the material evidence of the manuscript suggests a rather different conclusion. In fact, it is clearly a compilation of several texts from at least five different scribal hands, and more importantly a specimen artfully bonded from different books of hours and/or prayer books. However, there is little doubt that the miniatures were executed in the same campaign, if not by the same hand. With regards to the borders, things look different again, because an execution by distinctive artists and maybe even in different places is out of the question. Further analysis of some of the characteristic parts of the book may illustrate why these, admittedly, somewhat contradictory material indications are of such importance for the understanding of the whole manuscript and its history.

10 *Census of Medieval and Renaissance Manuscripts in the United States and Canada*, ed. by S. De Ricci, and W. J. Wilson, (New York: H. W. Wilson Company, 1935), vol. 1, cat. no. 328, 809.

11 Randall, vol. 3.2, note 4, cat. 295, 509–521.

Starting with a calendar (fol. 1–13v) written in a Burgundian *littera bastarda*, the predominantly English and northern French feasts indicate an English patron. Among those feasts are, for instance, St Wulstan,[12] King Edward,[13] St Cuthbert,[14] the translation of King Edward,[15] St Ethelreda,[16] the translation of Edward the Confessor,[17] and so forth. The same scribe has also written two suffrages to St Leonhard and St David (fol. 14–15v) that form the third quire, but another scribe apparently took the lead on the fourth quire.[18] However, it is not only the scribe who changed but the overall design (Fig. 1): A comparison of fol. 14 and 16 demonstrates that the first scribe used seventeen ruled lines, while the second one makes do with a ruling of only fifteen lines. Both the weaker red of the rubric differs as does the size of the pages: while the first three quires were 72 mm width by 96 mm height, the pages of the fourth quire measure 58 mm width by 88 mm height.

Moreover, the succession of texts is as frustrating as the low number of only two suffrages that are following the calendar. Only one out of five of the following gospel sequences (fol. 16–24) that were written by the second scribe is emphasized by a full-page miniature. The mentioned exception is the beginning of the gospels of St Luke (fol. 17v–18). Typically, this standard text is illustrated by a portrait of the apostle or his symbol, the winged ox or bull. In this manuscript, however, an *Annunciation* (fol. 17v) is painted on the blank verso page that follows the gospels of St John. It is not only the highly unusual incorporation of the *Annunciation* at this particular position in the book that raises suspicion but also the fact that it is not painted on a separate folio as was common in most of the Flemish manuscripts at the time of Simon Bening. By reading the text beginning on the opposing recto page (fol. 18): *In illo tempore Missus est angelus Gabriel*, it becomes clear why an illuminator could have had the odd idea to illustrate Luke's gospels with that scene. It starts with the beginning of the Christmas story. To date, I have not been able to find another (late) medieval example in which this text passage has been illustrated in a comparable way. The succeeding devotional prayers (fol. 24v–39) are correspondingly illustrated by a full-page miniature painted on the blank verso (fol. 24v) of the text end of St Mark. The image depicts *Christ child supported and flanked by six angels holding the instruments of the Passion* (Fig. 2a). Surely, this scene is a faithful copy after versions used in the Ganto-Bruges workshops, particularly in the workshop of the Maximilian Master and Simon Bening.[19] Thus, the comparison with the earliest known version executed between 1492 and 1504 by the Maximilian Master in the *Book of hours of queen Joanne of Castile* in Cleveland (Fig. 2b) demonstrates how stiffly the composition in the Baltimore prayer book is pinned onto a golden ground, whereas in the Cleveland version the composition is immersed in a lawn base. The same applies for the versions by Simon Bening in the *Prayerbook of Albrecht of Brandenburg* (Fig. 2c) in Los Angeles, and another

12 Jan. 19: Wlstani epi.

13 Mar. 18: Eduuardi regis (ruled 963–978).

14 Mar. 20: Cuthberthi epi.

15 Apr. 20: Translacio eduuardi regis (cf. Mar. 18).

16 Jun. 23: Etheldride.

17 Oct. 13: Translacio s. eduuardi regis (ruled 1003–1066).

18 The collation of ms. W.436 is: quire 1: 10 (fol. 1–10); quire 2: 4, with first folio canceled (fol. 11–13); quire 3: 2 (fol. 14–15); quires 4–7: 8 (fol. 16–47); quire 8: 4, including 48bis (fols. 48–50); quire 9: 6 (fol. 51–56); quires 10–18: 4 (fol. 57–92); quire 19: 4, with third folio canceled (fol. 93–95), cf. http://www.thedigitalwalters.org/Data/WaltersManuscripts/html/W436/description.html [last access: 12.8.2019].

19 To mention only the most important predecessors in chronological order: *Isabella Hours*, Cleveland, Cleveland Museum of Art, CMA 63256, fol. 50, 1492–1504, cf. http://www.clevelandart.org/art/1963.256.50.a [last access: 12.8.2019]; DaCosta-Hours, New York, PML, Morgan Ms. 399, fol. 385v, c. 1515, cf. https://www.themorgan.org/collection/da-costa-hours/758 [last access: 12.8.2019]; *Prayerbook of Cardinal Albrecht of Brandenburg*, Los Angeles, Getty Museum, Ms. LUDWIG IX 19, fol. 31v, c. 1525–30, cf. http://www.getty.edu/art/collection/objects/3963/simon-bening-the-christ-child-surrounded-by-the-instruments-of-the-passion-flemish-about-1525-1530/ [last access: 12.8.2019].

Fig. 2a: *Christ child supported and flanked by six angels holding the instruments of the Passion*, Baltimore, Walters Art Museum, Ms. W.436, fol. 24v, c. 1850(?) © Walters Art Museum.

Fig. 2b: *Christ child supported and flanked by six angels holding the instruments of the Passion*, Cleveland, Cleveland Museum of Art, CMA 63256, fol. 50, 1492–1504 © Cleveland Museum of Art.

Fig. 2c: *Christ child supported and flanked by six angels holding the instruments of the Passion*, Los Angeles, Getty Museum, Ms. LUDWIG IX 19, fol. 31v, c. 1525–30 © The J. Paul Getty Museum.

Fig. 2d: *Christ child supported and flanked by six angels holding the instruments of the Passion*, New York, PML, Morgan Ms. 399, fol. 385v, c. 1515 © The Morgan Library.

Fig. 3: *Virgin and the child and Strew border*, Baltimore, Walters Art Museum, Ms. W.436, fol. 39v–40, c. 1850(?), c. 1475 © Walters Art Museum.

version of the same illuminator or one of his workshop assistants in the so-called *Da Costa-Hours* (Fig. 2d), today kept in the Pierpont Morgan Museum in New York. While the composition is painstakingly and faithfully copied line by line, the miniature in the Baltimore prayer book fails to comply with either the high finish or the subtle execution of surfaces present in the three other examples.

It follows suffrages to female saints (fol. 39v–52v), first to the Virgin Mary, with the prayer *Sub tuam protectionem* [...] (fol. 40) and continued by prayers to St. Anne (fol. 41), St. Margaret (fol. 43), and so on. The text to the Virgin Mary is introduced by a full-page miniature (fol. 39v–40), once again painted in the sequence of the gathering and on the blank verso of the preceding text (Fig. 3). The miniature represents the virgin seated at the centre on a low grass-topped brick wall with the Christ child and attended by an angel against a red cloth of honour with canopy. A cleric in black habit kneels to the right behind the wall. Both his position behind the Virgin as well as his proximity to the Mother of God are highly unusual for miniatures from this period. The facing text is framed by a type of border of the highest quality (Fig. 3), which is usually connected with the Vienna Master of Mary of Burgundy and his followers, as suggested by the comparison to the border of the *Ecce homo* (fol. 69) in the so-called *Nassau Hours* in the Oxford Bodleian Library.[20] This kind of

20 *Nassau Hours*, Oxford, Bodleian Library, Ms. 219–220, fol. 69, c. 1470s, cf. https://digital.bodleian.ox.ac.uk/inquire/p/9dd2bf8a-7472-4a62-98c3-92eb4446713b [last access: 12.8.2019]. Cf. also: J. J. G. Alexander, *The Master of Mary Burgundy. A Book of Hours for Engelbert of Nassau, The Bodleian Library, Oxford* (New York: George Braziller, 1970).

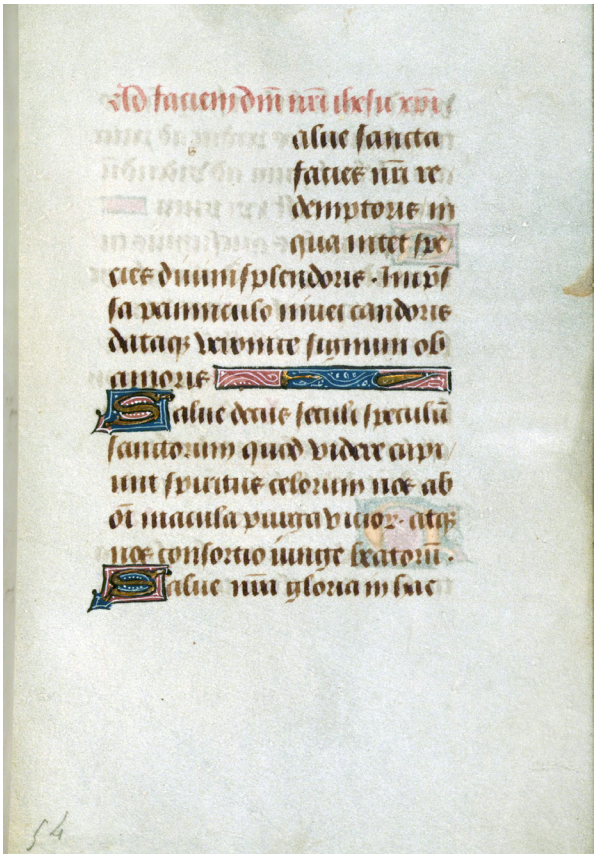

Fig. 4: Prayer *Salve sancta facies*, Baltimore, Walters Art Museum, Ms. W.436, fol. 53, c. 1475 © Walters Art Museum.

border-style had its climax between c. 1465 and 1500.

Consequently, it represents Simon Bening's father's generation or even one earlier generation, which leads directly to the question of why he or his workshop should have continued to work with such a style in the Baltimore manuscript. Similar borders can be found in a somewhat modified shape in the *Grimani Breviary*.[21] However, Simon's father Alexander Bening (c. 1450–1519) was still involved in the production of this manuscript. The combination of strew borders with silver tinted grounds combined with the use of a Burgundian *littera batarda* indicates the execution of this Flemish border type in the earliest possible period around 1470.[22] Therefore, it is somewhat unlikely to connect those borders with the workshop of Simon Bening.

The suffrage to St Barbara (fol. 48bis) remained imperfect, both in respect to the text as well as to the illumination. Another break is manifested at the beginning of the suffrage to the Holy Face, the prayer *Salve sancta facies* (fol. 53, Fig. 4). This appears to be true based on the observations, first, it forms part of an independent quire; second, it measures only 84 mm instead of 88 mm height; third, it has been written by a third scribe and is characterized by an old-fashioned text decoration in red, blue, and gold, embellished with white penwork.

Remarkably, the next miniature with the *Agony in the garden* (fol. 56v) is part of the same quire, even if it is painted on a leaf that is otherwise left blank (Fig. 5a). This brings us to the next caesura (Fig. 5a): the miniature is placed on the opposite side of the beginning of a devotional sequence, which begins with the prayer *Confitebor tibi domine* (fol. 57). The contrast to all previous parts is both visually and physically apparent. From this part on,[23] the parchment is thicker and of poorer quality, which is also indicative of the beginning of a new quire. Moreover, the succeeding pages now measure 65 mm instead of 58 mm width and 92 mm instead of 84 mm height. A different scribe was responsible for the execution of the *littera gothica hybrida*. Unlike his Flemish colleagues, he needed eighteen instead of fourteen or fifteen lines. However, first and foremost, both the text and the border convey a completely different type of decoration principle. As for the huge C-initial, a glance at a late 15th century Dutch prayer book offered at the Christie's Arcana sale in 2011 helps to

21 *Grimani Breviary*, Venice, Biblioteca Nazionale Marciana, cod. Lat. I, 99 (=2138), c. 1515, cf. E. König, and J. Heyder, *Das Breviarium Grimani* (Simbach am Inn: Buchhandlung Anton Pfeiler Junior, 2016).

22 Another good example for this kind of border decoration–typical for the Vienna Master of Mary of Burgundy –is present in the so-called *Madrid Hastings Hours*, Madrid, Fundación Lázaro Galdiano, Inv. 15503, cf. *Illuminating the Renaissance,* note 9, 155, ill. 25c.

23 The subsequent parts of the manuscript comprise: a Suffrage to the Holy Face (fol. 53–56), Devotional Sequences (fol. 56v–83v); Suffrages (fol. 84–94v), and a Prayer to the Virgin (fol. 95–95v).

Fig. 5a: *Agony in the garden and Confitebor tibi domine*, Baltimore, Walters Art Museum, Ms. W.436, fol. 56v–57, c. 1850(?), c. 1500 © Walters Art Museum.

Fig. 5b: *Nocturn*, Book of hours and Prayer book in Dutch, Christie's London, Arcana sale, 6.7.2011, lot 19, fol. 83, c. 1480 © *The Arcana Collection: Exceptional Illuminated Manuscripts and Incunabula, Part I, 7 July 2010, London*, King Street, ed. by Christie's, (London: Christie's, 2010), lot 19.

classify this part of the book (Fig. 5b).[24] Apparently, it is of Dutch origin.

It is, thus, all the more surprising to find already on the verso of the *Confitebor tibi domine* prayer a miniature with *Christ as a Man of Sorrows Seated on Cross* (fol. 57v–58, Fig. 6), revered by a cleric in a black habit. The miniature is painted in the same style present in all former parts of the manuscript. The O-initial of the pre-Communion prayer starting on the opposite side with *O fons totius misericordie* (fol. 58) is embellished by a shield against red ground containing the monogram "P R". The letters are linked by blue strapwork with the fancy Italian motto "DA VIVERE" above. It is not clear whether these elements have been

24 Book of hours and Prayer book in Dutch, Christie's London, Arcana sale, 6.7.2011, lot 19, fol. 83, c. 1480, cf. *The Arcana Collection: Exceptional Illuminated Manuscripts and Incunabula, Part I, 7 July 2010, London, King Street*, ed. by Christie's (London: Christie's, 2010), lot 19.

Fig. 6: *Christ as a Man of Sorrows Seated on Cross and O fons totius misericordie*, Baltimore, Walters Art Museum, Ms. W.436, fol. 57v–58 c. 1850(?), c. 1500 © Walters Art Museum.

added to the O-initial and whether the border decoration took part of the original Dutch decoration campaign, or if it was used to melt together the different sections to one homogenous book, consisting of thirteen miniatures and additional nine historiated initials in Ganto-Bruges style. This attempt to conceal discontinuities not only applies stylistically but also with regard to repeated figures like the cleric in a black habit (ill. 3, 6). Evidently, he is the blueprint for a patron in a prayer book, and, consequently, Lilian Randall and her colleagues at the Walter's Art Gallery assume an ecclesiastical patronage with English connection.[25]

Actors: A Parisian Bookbinder and "homme d'un goût éminemment artistique" and an American collector

There is no doubt that the volume is a compilation of more than one manuscript. The manuscript's material evidence, therefore, is open to two conflicting interpretations: a first option could be that we are dealing with parts of different late medieval prayer books and/or books of hours that have been merged during the life of artists like Simon Bening or his daughter Lievine Teerlinc. A second prospect might be that we are dealing with parts of books that have been merged at some point in the 19th century. If the second solution applies, it is likely that someone artfully covered up the discrepancies between the different parts using a coherent illustration. Indeed, all of the miniatures originate in well-known Ganto-Bruges

25 Cf. http://www.thedigitalwalters.org/Data/WaltersManuscripts/html/W436/description.html [last access: 15.8.2019].

patterns. However, this is no guarantee for their authenticity.

Occasionally it occurred in the 15th and 16th centuries that a book project that had been started by earlier miniaturist was continued at later times and by order of new patrons. The famous *Très Belles Heures,* originally ordered by Jean, the Duc of Berry, and the connected *Turin-Milan-Hours* are good examples for such a procedure.[26] To my knowledge, however, not one single example for a compilation of a prayer book and/or a book of hours from the 15th or 16th centuries has yet been put forward to suggest that it was a known practice to homogenize different parts with each other via shared illustrations.[27] "Errors" like the *Annunciation* miniature for the introduction of the gospels of Saint Luke appear to be unlikely for a time in which illustrative traditions left almost no room for creative variations. In the 19th century, by contrast, eccentricities like this seem to be much more feasible. The 19th century also fits because of the strict adherence to the textual orientation, which could explain the odd placement of the *Annunciation*-miniature in the first place. Conclusively, the hypothesis is that someone brought together all the bits and pieces and gave them a uniting form. Who, then, would be a better candidate than the bookbinder, who established the manuscript's current condition?

The mid-19th-century French brown leather binding was executed by the Parisian bookbinder Charles-François Capé (1806–1867).[28] His last name is printed in gold capitals centred on the inside of the front cover.[29] As the manuscript was purchased by the art collector, philanthropist, and founder of the Walters Art Gallery, Henry Walters (1848–1931) between 1895 and 1931, it is out of the question that he and Capé, who died in 1867, came into contact with each other. According to Roger Devauchelle, Capé had obscure, even illiterate origins.[30] Nevertheless, he was one of the most renowned bookbinders and amateurs in painted parchment and paper in the years between 1830 and 1860. His binding styles were regarded as retrospective;[31] they sought to imitate works from 16th century Renaissance bookbinders like Jean Grolier to mention only the most prominent exponent.[32] Shortly after Capé's demise, his collection of old books, prints, vignettes, drawings, as well as manuscripts was auctioned. It is remarkable to see that he possessed, amongst many other objects, miniatures on parchment, some of which with religious subjects. A "monsieur Vignères" praised the deceased Capé in the preface as follows:

26 Cf. F. Boespflug and E. König, *Die Très Belles Heures von Jean de France, Duc de Berry: ein Meisterwerk an der Schwelle zur Neuzeit (die Très Belles Heures de Notre-Dame, Manuscrit Nouv. acq. lat. 3093, Bibliothèque Nationale, Paris ; das verbrannte Turiner Gebetbuch, K.IV.29, Biblioteca Nazionale Turin ; die Blätter im Louvre, RF 2022, 2023, 2023v, 2024, 2025, Musée du Louvre, Paris ; der erhaltene Band mit Messen, Museo Civico, Turin)* (Luzern: Faksimile Verlag, 1998); A. Van Buren et al, *Heures de Turin-Milan : Inv. Nr. 47 Museo Civico d'Arte Antica e Palazzo Madama Turin. Faksimile* (Luzern: Faksimile Verlag, 1996).

27 Practices like the editing and correction of border decorations like in *Grimani Breviary* have a completely different quality, cf. König, and Heyder, note 21, 47–59.

28 Capé was active at 16 rue Dauphine in Paris, between 1848 and 1867, cf. R. Devauchelle, *La reliure en France de ses origines à nos jours* (Paris: Rousseau-Girard, 1960 [1859–1861]), vol. 2, 200, 205 and vol. 3, 41–42; J. FLETY, 'Contribution à la connaissance d'un relieur du XIXe siècle, Charles François Capé', in: *Revue française d'histoire du livre*, 37.1982, 733–743. For another Capé binding, cf. also: *The History of Bookbinding, 525–1950 A.D.: An Exhibition Held at the Baltimore Museum of Art, November 12, 1957, to January 12, 1958*, ed. by D. Miner (Baltimore: Trustees of the Walters Art Gallery, 1957), cat. no. 554.

29 Cf. http://www.thedigitalwalters.org/Data/WaltersManuscripts/W436/data/W.436/sap/W436_000002_sap.jpg [last access: 17.8.2019].

30 Devauchelle, vol. 3, note 28, 41–43 [41].

31 W. De Bruijn, and G. Mandelbrote, *The Arcadian Library: Bindings and Provenance* (Oxford: Oxford University Press, 2014), 161.

32 A characteristic Grolier binding is present in *De origine de amplitudine civitatis Veronae*, Oxford, Bodleian Library, S 528, Grolier-binding, cf. https://digital.bodleian.ox.ac.uk/inquire/p/cc4dc6a1-4faa-467e-b3d7-8acc862c11e4 [last access: 17.8.2019]. A comparison to one of Capé's bindings in the Bibliothèque nationale de France emphasizes the relation between both the 16th and the 19th century bookbinders, cf. *Book of hours for the use of Rome*, Paris, Bibliothèque nationale, NAL 3250, Capé-binding.

> For me, he always was a man with eminent artistic taste [homme d'un goût éminemment artistique] both in the bookbinding as well as in the illustration of books. He knew how to conduct and assemble the most famous book bindings and gildings with meticulously care and even to make them more perfect; it is very rare that one single man is perfectly doing the entire binding of a book.[33]

After all, Capé not only took care of the binding itself but also of the book's illustration. Or to put it differently: was Capé able to organize contemporary illuminators to recreate a book out of miscellanies by adding miniatures in a refined manner? In the light of those considerations, this could be the case; however, the question remains: why should he have embarked on such a time-consuming endeavour? One possible answer to this question is certainly the growing art market. Art collectors like Henry Walters enthusiastically bought medieval artworks, even if, in light of his wide-ranging collecting interests, detailed knowledge in the characteristics of late medieval art cannot be assumed.

Practices: Forging, Restoring or A Question of Aesthetics?

In the *Bulletin du Bibliophile* from 1853, the bibliophile Paul van Malden bemoaned the bookbinders' custom to particularly copy Renaissance designs: "One is copying the ancients more or less servile and with more or less skill. [...] But why such torpidity? The arts cannot develop as long as they are in the hands of simple craftsmen [...]."[34] Roger Devauchelle commented on the situation with reference to the motto of the Paris exhibition of 1855: "NOUS NE POUVONS QUE COPIER LES ANCIENS" –"We copy nothing but the ancients" (my translation).[35] In fact, it was at that time that artisans retrieved not only centuries-old patterns but also traditional painting techniques. The knowledge of such working processes grew rapidly so that at the end-of-the-century journals like *Le Coloriste enlumineur. Journal d'enseignement du dessin, de la miniature* [...] saw the light of day.[36] The journal propagated the art of illumination as a bourgeois hobby to be practised in the well-equipped living room.

Skills in the art of illuminating manuscripts were, however, indispensable, for instance, in the case of the collection of the bibliophile John Boykett Jarman (1782–1864), which fell victim to a flood of the River Thames.[37] A former Jarman book of hours today kept in the Bibliothèque nationale de France in Paris[38] possesses damaged but largely untouched original miniatures as well as such that were repainted by the late 19th century illuminator Caleb William Wing (Fig. 7). In particular, the young female's sweet and rosy face on fol. 76v of NAL 3210 (Fig. 7) reveals the miniature's execution,

33 The original quote reads as follows: "Il fut toujours pour moi un homme d'un goût éminemment artistique, tant pour la reliure que pour l'illustration des livres, d'un soin minutieux afin de faire toujours plus parfait, sachant, au plus haut point, diriger et réunir les travaux des plus fameux ouvriers relieurs et doreurs; car il est très-rare qu'un seul homme fasse entièrement et parfaitement la reliure d'un livre." My translation. Cf. *Catalogue d'Estampes anciennes & modernes livres à figures vignettes pour illustration [...] composant la Collection de Feu M. Capé, ancien Relieur dont la Vente aura lieu Hotel des Comissaires-Priseurs, Rue Drouot [...]*, (Paris: Drouot, 1868), 3.

34 The original quote reads as follows: "On copie les anciens artistes plus ou moins servilement, avec plus ou moins de bonheur. [...] Pourquoi cet engourdissement? Les arts ne peuvent progresser lorsqu'ils sont abandonnés à de simples ouvriers [...]." My translation. Cf. Devauchelle, vol. 3, note 28, 15–16.

35 The passage reads as follows: "Cet appel demeura sans écho [...] les grands relieurs, entre 1850 et 1870, ne purent échapper à la loi commune: Capé, Lortic, Duru, Marius-Michel père, Niedrée et Trautz exercèrent leur profession en la basant sur cet axiome écrit en toutes lettres dans le rapport de l'Exposition de 1855: NOUS NE POUVONS QUE COPIER LES ANCIENS", cf. Devauchelle, vol. 3, note 28, 15–16.

36 Cf. note 5.

37 Cf. J. Backhouse, 'A Victorian Connoisseur and His Manuscripts: The Tale of Mr. Jarman and Mr. Wing', in: *British Museum Quarterly* 32 (1967–68): 76–92.

38 *Book of hours for the use of Rome*, Paris, Bibliothèque nationale, NAL 3210, cf. https://archivesetmanuscrits.bnf.fr/ark:/12148/cc71698t [last access: 15.8.2019].

Fig. 7: *Nativity and Death with Young female*, Paris, Bibliothèque nationale de France, ms. NAL 3210, fol. 29, 76v, 15th century / 19th century © Bibliothèque nationale de France.

which took place long after the original painting campaign. The Jarman case is and exemple of the unconstrained involvement of modern miniaturists in the late 19th century. Another example exemplifies the existence of a 18th or 19th century "album of miniatures". The manuscript compilation in the Bibliothèque Louis Aragon in Amiens is pasted together with the help of the cuttings of at least five books of hours or prayer books.[39] The manuscript entered the library in 1891 and seemed to be assembled in the Amiens Augustinian convent somewhere between 1664 and 1791.[40] The cuttings used for their part belong to manuscripts, whose illustrations not only had different places of origin but also different times of execution. Even if the underlying design principles may not be equal to those of the Baltimore manuscript Walters 436, the Amiens example represents the wide variety of a culture that was open to the art of the pastiche.

Conclusion

Neither Caleb Wing's repaintings nor the *Amiens album* are likely to be the result of an intent to defraud. They rather reflect an openness for idealizing restorations as well as an aesthetically guided rearrangement of miniature cuttings. Hence, my proposition is to interpret the presented material observations of the first chapter together with the little we do know about the French bookbinder Capé in the second chapter as

39 Amiens, Bibliothèque Louis Aragon, Ms. 107 C, cf. https://bvmm.irht.cnrs.fr//resultRecherche/resultRecherche.php?COMPOSITION_ID=9946 [last access: 4.5.2019].

40 Cf. https://artmiens.wordpress.com/2018/04/16/lalbum-de-miniatures-damiens-decoupages-et-collages-de-fragments-denluminures/ [last access: 4.5.2019].

an extraordinary example of an attempt to rescue dismembered parts of devotional manuscripts by creating something entirely new. The success of his assumed intervention is emphasized by Randall's conclusion that the Baltimore manuscript was done by the Bening workshop. It is, however, the most unlikely solution. Instead by imagining someone who creates new and intact manuscripts out of older bits and pieces suits well to a manuscript with a Capé binding held in the BnF in Paris.[41] It needs a second and third look to realize the almost invisible additions to some of the folia therein. Apparently, some pages had lost their lower parts for unknown reasons, and they were fixed by Capé while he executed the new binding. This could be, at least, an indication of more comprehensive restoration works by his workshop. Therefore, it cannot be ruled out that the Baltimore manuscript is such a "restoration piece". Then, however, the restoration would have reached a completely new dimension: the bookbinder would have not only invented a new physical entity but also – and surely with the help of a gifted miniaturist – an unprecedented illustrative programme.

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41 *Book of hours for the use of Rome*, Paris, Bibliothèque nationale, NAL 3250, https://archivesetmanuscrits.bnf.fr/ark:/12148/cc100283d [last access: 13.8.2019].

Gašper Cerkovnik

SOME OBSERVATIONS ON USE OF BOOK ILLUSTRATIONS FOR POPULAR SOUTH-GERMAN PRAYER BOOKS AS MODELS IN CENTRAL EUROPEAN ART

Zusammenfassung

Schriftliche Quellen und eine beträchtliche Anzahl von erhaltenen süddeutschen Gebetsbuchillustrationen aus dem Kreis Albrecht Dürers als selbstendige Drucke in modernen Grafischen Sammlungen weisen darauf hin, dass es nicht ungewöhnlich war, dass Buchillustrationen dieser Zeit als einzelne Drucke verkauft wurden, unabhängig von ihrer Größe. Dies hat positive und negative Konsequenzen bei der Recherche von Buchillustrationen als Vorbild für andere Kunstwerke. Positiv zu vermerken ist, dass es ein besseres Verständnis dafür gibt, wie einige Buchillustrationen in teilweise überwiegend Analphabeten und wirtschaftlich schwierigen Umgebungen so populär wurden. Negativ ist, dass wir berücksichtigen müssen, dass diese Drucke vom Künstler und Mäzen möglicherweise nie als spezifische Buchillustrationen erkannt wurden, wodurch ein Teil ihres ursprünglichen Kontexts und ihrer Bedeutung verloren ging.

Key-words: prayer book illustrations, South Germany, *Salus animae*, *Hortulus animae*, print market

Introduction

The period around 1500 is marked by one of the greatest flourishings of the fine arts in Central Europe. Images of sacred and increasingly secular nature covered the churches, houses and even streets in the form of altars, pulpits, epitaphs, venerated images, interior and exterior wall paintings, illuminated and printed books, independent prints and pamphlets, decorative arts, and others. The expansion of visual arts was greatly reinforced by printed media such as woodcuts and engravings – older techniques that finally came into their own with the spread of the printing press and paper mills in the last decades of the 15th century. Printed media not only distributed knowledge – it was crucial in disseminating artistic style and compositions, which inspired other artists or could be used as models or templates for less imaginative masters. The never-before-seen flourishing of visual arts of the pre-Reformation era was interrupted by the Reformation and later to some extent by the Counter-Reformation in the Catholic lands. The abundance of different artworks was decimated and fragmented by series of subsequent tragic events that dragged into the 20th century. Many artworks that survived lost their original historical context and,

consequently, all the information about their authors, patrons, dates of completion, functions, and other aspects. Identifying printed models is often the only way to determine when a specific artwork in the form of painting or sculpture was made (in most cases as *terminus post quem*), the meaning it may have had, and the cultural and artistic background of the artists and the patrons. The more artworks we can register as being modelled after prints and the more information we can connect to the used prints, the more we can deduce about the art of the period. Unfortunately, the prints were not immune to later historical events either: some were deliberately destroyed due to their unsuitable or unfashionable content, others by accidental disasters or by otherwise unsuitable environments. Recent studies, such as that of Peter Schmid on printed images in south German manuscripts of the 15th century,[1] show the complex use of prints since the beginning of the new media and the problematic legacy of the overly eager systematization of early researchers. Most of the early prints were systematically removed from their historical settings, often cleaned of any additional writing and coloration, and included in specialized print collections. In these regards, printed images produced as illustrations for printed books seem to be a more reliable source – they are usually much easier to date and localize and have an accompanying text explaining their meaning. Nevertheless, a closer inspection of historical sources and preserved examples of book illustrations from this era reveal a more complex situation.

Printed illustrations for small-format prayer books

It is a long-known fact that major graphic series by Dürer were available as independent prints long before they were published as book illustrations.[2] For artists and to some extent collectors, separately printed woodcuts or engravings were probably more desirable, since the image was not disturbed by print on the opposite side. Buying separate prints and not the whole book was also a reasonable choice from the financial point of view.[3] Somewhat more surprising is the fact that the similar was true for the group of small woodcut illustrations from southern Germany. Of special interest are several woodcut series of modest size but relatively high artistic and technical value that heavily rely on Dürer's compositions and style, and were made by artists closely connected to the great Nuremberg master. All the series were intended for popular prayer books of the period entitled in Latin *Hortulus animae* (Little Garden of the Soul, *Seelengärtlein* or *Würzgertlein* in German) and *Salus animae* (The Salvation of the Soul) – later being a Nuremberg version of the first.[4] The most important and problematic is the *Salus animae* series published in Nuremberg in 1503 (with disputed attribution to Dürer himself[5]), followed by several *Hortulus animae* series by Dürer's co-workers: Hans Baldung called Grien's published in 1511 and 1512 in Strasbourg, Erhart Schön's from c. 1515 and Hans Springinklee's series from 1516 and 1518 published in Lyon and Nuremberg. All

1 P. Schmidt, *Gedruckte Bilder in handgeschriebenen Büchern: zum Gebrauch von Druckgraphik im 15. Jahrhundert* (Köln – Weimar – Wien: Böhlau Verlag, 2003), 1-17.

2 The most important in this regard are the two woodcut series *The Large Passion* and *The Life of the Virgin* both published in 1511: A. Fröhlich, 'Die Große Passion' & A. Scherbaum, 'Das Marienleben', in: *Albrecht Dürer: Das druckgraphische Werk: Band II: Holzschnitte und Holzschnittfolgen*, ed. by R. Schoch & M. Mende & A. Scherbaum (München – Berlin – London – New York: Prestel 2002), 176-213, 214-279.

3 For a concise overview of prices of prints from Nuremberg, see: W. Schmidt, 'Nürnberger Kunst- und Graphikpreise der Dürerzeit', in: *Anzeiger des Germanischen Nationalmuseums* (2002), 241-252.

4 M. C. Oldenbourg, *Hortulus animae. [1494]-1523: Bibliographie und Illustration* (Hamburg: Dr. Ernst Hauswedell & Co., 1973).

5 The authorship of *Salus animae* series and the unpublished series depicting sunday gospels divided Dürer-scholars in two equally prominent groups, the view against Dürer's authorship currently prevailing: A. Scherbaum, 'Gebetbuch' and 'Andactsbuch mit Sonntagsevangelien', in: *Albrecht Dürer: Das druckgraphische Werk: Band III: Buchillustrationen*, ed. by R. Schoch & M. Mende & A. Scherbaum (München – Berlin – London – New York: Prestel 2004), 494-523.

the above-mentioned artists probably had access to Dürer's collection of drawings and prints.[6]

The structure of the prayer book was based on that of Books of Hours, with greater emphasis on mystic texts and specialized prayers that included Indulgences – like in the case of the prayer of St. Gregory the Great and the prayer to St. Anna with Virgin with Child.[7] The prayers to saints were (depending on where they were published) often customized to be better adapted to local traditions – in the case of *Salus animae*, for example, the local St. Sebald received special attention. The popularity and accessibility of these prayer books published not only in Latin but also in various German dialects, French, Czech and Polish, on often low quality and therefore cheaper paper, probably introduced south German graphic art to entirely new and previously inaccessible audiences throughout Central Europe. Research on the impact of these series on other artistic media, primarily painting, to a lesser extent in decorative arts (metal engraving) and sculpture, is scarce in comparison to better-known prints of the leading masters of the period, like Dürer and Cranach, but shows this was considerable.[8] The influence these series exerted in other fine arts media must be regarded as the consequence of their unique combination of the fashionable Dürer style, highly detailed technical execution, and popular iconographical motifs. The latter was dictated by the form of the prayer book itself. The *Hortulus animae* prayer book (and its variations) included illustrations depicting the life and images of Christ and Mary, and the apostles, as well as images of different saints. This made them a highly useful compendium of Christian narrative scenes and different figures of saints. Furthermore, the standing figures could be remodelled, without much effort, into any saint needed with simple changes of attributes.

The influence of *Hortulus animae* illustration can be easily explained by numerous cheap publications, which is not the case with the *Salus animae* prayer book. The series of 63 small woodcut illustrations (each measuring 61 × 41 mm) was created for a pocket-sized prayer book with the full title of *Salus animae, dos ist der selen hayl wirt gena[nn]t*, published in Nuremberg on October 18th 1503 by Hieronymus Höltzel. The booklet has 288 sheets and 65 illustrations, the illustrations with St. Hieronymus and St. Sebald being duplicated. This prayer book is quite rare, with only six copies known world-wide (the most complete copy is in the Library of Congress, Washington DC).[9] The unusually high quality of illustrations for this type of book in this early period and the fact most of the surviving copies are printed on parchment, coloured, and even illuminated suggests Höltzel's initial target audience was wealthy Nuremberg patricians. We do not know precisely what happened to the woodcut plates – although some were used as book illustrations later, we should seriously consider that most of

6 Baldung, Springinklee and Schön at different periods collaborated with Dürer; *Meister um Albrecht Dürer. Ausstellung im Germanischen National-Museum vom 4. Juli bis 17. September*, ed. by P. Strieder and others (Nürnberg: Germanisches Nationalmuseum: Anzeiger Germanischen Nationalmuseums, 1961). For a critical review of Dürer's workshop and his relationship to other artists, see: A. Grebe, 'Maister nach Dürer. Überlegungen zur Dürerwerkstatt', in: *Das Dürer-Haus. Neue Ergebnisse der Forschung*, ed. by U. Großmann and F. Sonnenberger (Nürnberg: Germanisches Nationalmuseum 2007), 121-140.

7 F. X. Haimerl, *Mittelalterliche Frömmigkeit im Spiegl der Gebetbuchliteratur Süddeutschlands*, (München: Münchener theologische Studien. Abt. 1. Bd. 4., 1952), 123-149.

8 K. Löcher, 'Zur Nachwirkung der Druckgraphik von Hans Baldung Grien. Das Straßburger Gebetbuch von 1511', in: *Pinxit, sculpsit, fecit. Kunsthistorische Studien. Festschrift für Bruno Bushart*, ed. By B. Hamacher & C. Karnehm (München: Deutscher Kunstverlag 1994) 51-58; J. Höfler, *Die Tafelmalerei der Dürerzeit in Kärnten (1500-1530)* (Klagenfur: Verlag des Geschichtvereines für Kärnten 1998) 28; G. Cerkovnik, '*Lesorezne ilustracije nemških tiskanih molitvenikov poznega 15. in zgodnjega 16. stoletja: pomen in vpliv v drugih likovnih medijih*' [Woodcut Illustrations of the German Printed Prayer Books of the Late 15th and Early 16th Centuries: Their Meaning and Influence in Other Fine Arts Media] (unpublished doctoral thesis, University of Ljubljana, 2010); G. Cerkovnik, 'Eine Gruppe von Tafelbildern aus dem Anfang des 16. Jahrhunderts in der Abtei Lichtenthal, Baden-Baden, und deren graphische Vorlagen', in: *Zeitschrift für die Geschichte des Oberrheins*, 162 (2014), 209-230.

9 Scherbaum, note 5, 494.

them were at least for some period primarily used to print separate prints for artists and collectors. This is indicated by the circumstances in which the series was introduced to art history.

Historical sources on print production and distribution

In 1909, the British art historian Campbell Dodgson (at the time the librarian at the British Museum and later keeper of Prints and Drawings) – not yet aware of the published prayer book – reconstructed the whole series with a large quantity of separate prints of equal measurements and styles in several European print collections.[10] The prints printed only on one side of the paper sheet are often dismissed as proof prints ("Probedrucke" in German). Proof prints were made during the preparation of a matrix (wooden or metal) by artists or specialized print artisans to test the print. However, many of the *Salus animae* separate prints show no signs of being proof prints; they all show the final state, which supports the thesis they were readily available as independent prints. Furthermore, some show damage from heavy use that (according to our knowledge) cannot be explained with their use in books (Fig. 1).

The practice of book illustrations being printed and sold separately in Nuremberg is supported by two written sources from the end of the 15th and the beginning of the 16th centuries. The first can be found in the records of Sebald Schreyer, Nuremberg humanist, merchant, publisher, and Dürer's neighbour, who undertook a very ambitious book project in the last decade of the 15th century. He was preparing the publication of an extensive text by German humanist Peter Danhauser entitled *Archetypus triumphantis Romae*. The project was never finished and the manuscript lost, but with the

Fig. 1: Albrecht Dürer (?),
Saint James the Great, *Salus animae*, 1503
(The Art Gallery of Ernest Zmeták, Nové Zámky).
Source: https://www.webumenia.sk/en/dielo/SVK:GNZ.G_563..

help of surviving illustrations we can with some certainty presume it was some sort of humanist encyclopaedia. Fortunately, Schreyer kept a memorial book ("Memorialbuch", now in the library of Germanisches Nationalmuseum), which contains several contracts and cost accounts with the author and with the woodcutter Sebald Gallensdorfer between the years 1493 and 1497, which give us some glimpse in production of prints of the time. From the beginning, the illustrations were considered an indispensable part of the project. Danhauser committed himself to provide the needed models for illustrations that were then transferred to wood blocks by painters. Some composition had to be made anew by local painters; according to the style of several illustrations kept as separate prints, Schreyer chose the workshop of Dürer's teacher Michael Wolgemut. Blocks were cut by Gallensdorfer

10 C. Dodgson, *Holzschnitte zu zwei nürnberger Andachtsbüchern aus dem Anfange des XVI. Jahrhunderts*, (Berlin: Graphische Gesellschaft 1909).

afterwards. The accounts reveal how much the work of different professionals in this process was valued at the time. The highest payment was received by the woodcutter Gallensdorfer, followed by the author Danhauser, the anonymous transfer-painters and the painter-inventor. According to the contract, Schreyer expected much from Gallensdorfer: he had to commit entirely to the project, not taking any other jobs, and he was not allowed to sell separate prints or even talk about them or show anybody what he was doing. Schreyer's strict demand that Gallensdorfer not be allowed to sell illustrations as separate prints suggests that this was a common practice at the time.

The second written source that supports this practice and even describes in what form the small prayer book illustrations were sold on the market dates from a couple of decades later. In the winter of 1520/1521, Ferdinand Columbus, son of Christopher Columbus and a high dignitary in the Spanish court, visited Germany and the Netherlands, spending much time and money on buying books and prints. His inventory describes over one hundred small illustrations with Christian motifs intended for prayer books, often a group of them being printed on one sheet of paper that could be cut later.[11]

The abovementioned written sources and the considerable number of surviving prayer book illustrations from the circle of Albrecht Dürer as separate prints in modern prints collections indicate it was not uncommon for book illustrations of this period to be sold as individual prints, regardless of their size. This has positive and negative consequences when researching book illustrations as models for other artworks. On a positive note, it allows for a better understanding of how some book illustrations became so popular in sometimes predominately illiterate and economically challenged environments. However, it must be taken into account that these prints may have never been recognized as specific book illustrations by the artist and patron, thus losing some of their original context and meaning.[12]

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11 P. Parshall, 'Ferdinand Columbus's Prints after 1500 from the German-Speaking Regions', in: M. P. McDonald, *The Print Collection of Ferdinand Columbus (1488–1539). A Renaissance Collector in Seville* (London: British Museum Press 2004), 177.

12 Source of illustration: Web umenia, https://www.webumenia.sk/en/dielo/SVK:GNZ.G_563.

Matej Klemenčič

VENETIAN EARLY MODERN SINGLE-LEAF PRINTS AFTER CONTEMPORARY SCULPTURE: QUESTIONS OF FORM AND FUNCTION

Riassunto

Durante l'epoca moderna, sia la scultura classica che quella moderna furono spesso tradotte a stampa. Queste stampe sono state pubblicate in diverse occasioni e utilizzate per vari scopi, spesso in serie con illustrazioni di importanti opere d'arte, come ad esempio a Roma, o come cataloghi di intere collezioni di sculture. D'altra parte, potevano rappresentare un singolo pezzo di scultura e potevano essere realizzate per scopi di marketing, celebrativi o propagandistici o altro ancora. L'articolo discute alcune di queste stampe singole, incise per illustrare le opere dello scultore veneziano Antonio Corradini, e pubblicate a Venezia, Vienna e Roma. Le incisioni vengono discusse in vista della loro funzione e dello sviluppo della carriera di Corradini.

Keywords: single-leaf prints, sculpture, Venice, Baroque, Antonio Corradini

In one of his early drawings, Giambattista Tiepolo portrayed his colleagues and friends, gathered sometime between 1716 and 1718 in a so-called "accademia del nudo", a drawing academy organised by Collegio dei pittori on Fondamenta Nuove in contrada Santa Maria Formosa, in Venice (Fig. 1). Recently, the two figures on the right were identified as Gregorio Lazzarini (standing) and Antonio Balestra (sitting, and acting as a corrector), while the others remain anonymous. Mostly they are immersed in the drawing of a standing naked male model on the left. The only exception is the artist sitting in the upper row who stands out not only as a little taller than the others but also because he is evidently not drawing, but instead modelling a statue in clay with his hands: a sculptor, therefore, whom Tiepolo wanted to distinguish from the others, most probably all of them painters. It would be intriguing to identify him with one of the younger Venetian sculptors of the time but, unfortunately, there is little evidence that would help us deduce his name.[1]

Even though our anonymous sculptor was carefully singled out by his contemporary Tiepolo, at the time still a young, but already a very promising painter, this

1 For the drawing see, most recently, E. Lucchese, 'Nel segno della grazia. Antonio Balestra maestro di Anton Maria Zanetti di Girolamo e nella "Scuola del Nudo" di Giambattista Tiepolo', in: *Valori Tattili*, 9 (2017), 166 ss. (with bibliography). The drawing, still in private collection, has been earlier in Haseltine collection in London and later in Rasini collection in Milan; see A. Morassi, *Disegni antichi dalla collezione Rasini in Milano* (Milano: Ulrico Hoepli, 1937), 47, cat. num. LXVIII; A. Morassi, "A 'Scuola del Nudo' by Tiepolo", in: *Master Drawings*, 9 (1971), 43-50.

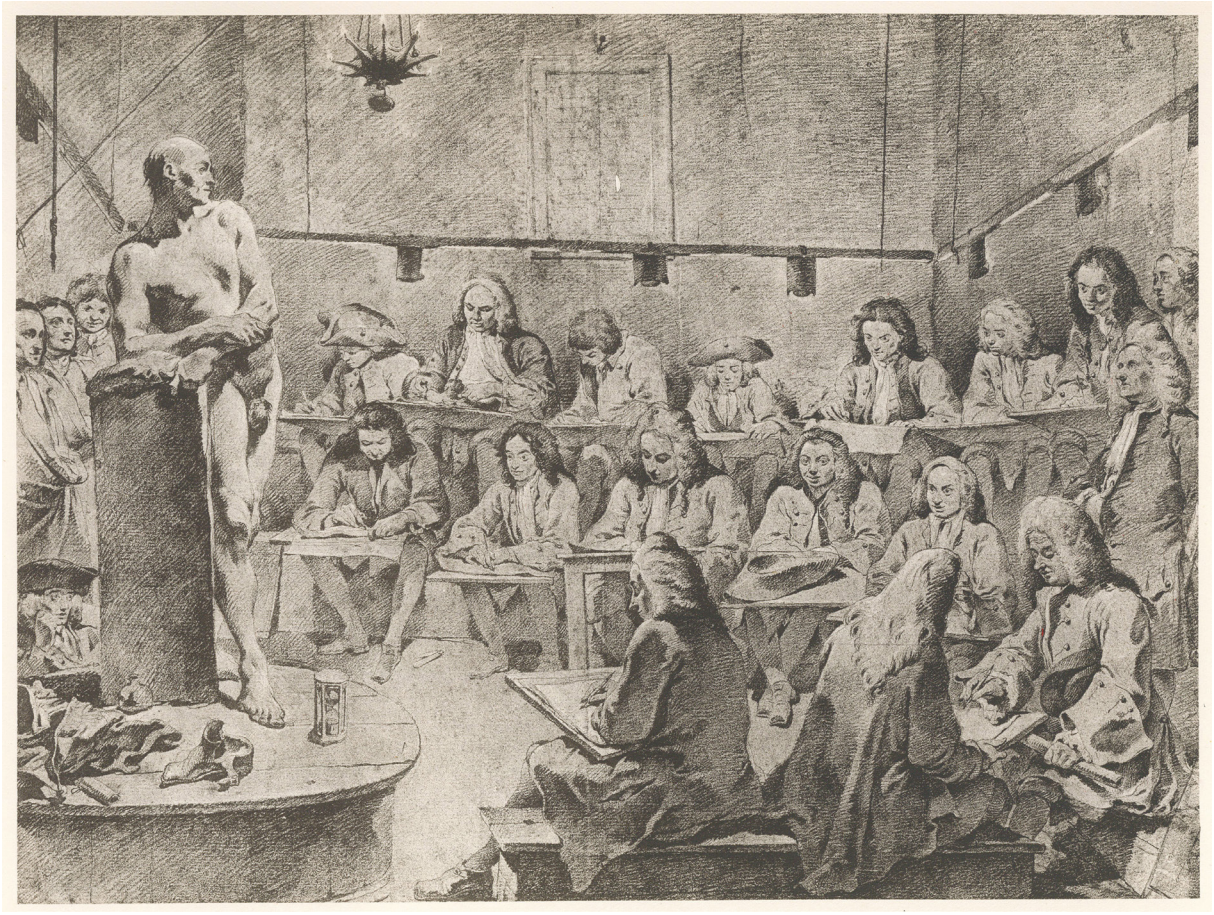

Fig.1: G. Tiepolo, *Scuola del Nudo*, 1716-1718. Private collection (Morassi, note 1 (1937), tab. LXVIII).

essay will discuss one of many specific connections between the arts of painting and sculpture, and especially the presentation of sculpture in two dimensions. Regarding this, there are several questions, for example, the importance of preparatory drawings for sculptors, drawings and paintings of sculpture, and presentation of sculpture in prints. Unfortunately, all these questions have rarely been discussed and only a small number of drawings by Venetian sculptors from the decades around 1700 have been identified; the number of known prints made after contemporary sculpture also remains considerably small. During the early modern period, these prints were published on different occasions and used for various purposes, often in series as illustrations of important works of art, or as catalogues of whole collections of sculpture. Furthermore, they could also represent a single piece of sculpture and could be made for marketing, celebratory, or propagandistic purposes, among others. In the case of Venice, we will concentrate on this last group, on the single-leaf prints of contemporary sculpture, on prints that were not originally intended to become part of a larger compendium. Since they were not bound into books, they were also more vulnerable, and several prints are therefore available today in a very small number. Their form and function will be discussed on the example of Antonio Corradini, arguably most famous of the 18th-century Venetian sculptors before Antonio Canova. His unique position among contemporary Venetian sculptors and his extraordinary international career can shed a special light on illustrations of his most essential achievements in marble, their function, and contemporary response to them.

Relations between sculptors and painters, reciprocal reception of their works,

and possible influences have been at least partially studied, especially for the later 17th century and for some of the most important artists of the *Settecento*: for Giusto Le Court, Enrico Merengo, Antonio Zanchi, and Johann Carl Loth, as well as for Sebastiano Ricci, Giovanni Battista Tiepolo, Pietro Baratta, Antonio Tarsia, Giovanni Maria Morlaiter, and Antonio Corradini, among others.[2] One of the most direct demonstrations of painters' reception of sculptural work is a drawing after a certain piece of sculpture. In such cases, we can observe how important for them was the choice of different points of view just to capture the main characteristics of the statue under observation. Classical statuary was evidently one of the most obvious choices to study,[3] and so sometimes was also modern sculpture. Among the latter, drawings by Giambattista Tiepolo and his sons after busts by Alessandro Vittoria are among the best-known examples.[4]

In contrast, studies of contemporary drawings of sculptors are of great importance for understanding their working procedures. For Venice (and Veneto), an important nucleus of sculptural *bozzetti*, *modelli*, and *riccordi* have been preserved in two workshop collections – *fondo di bottega* – of Giovanni Maria Morlaiter and the Marinali family, and several other works have also been identified.[5] However, the number of known drawings remains relatively small, and the largest collection is again from the workshop collection of the Marinali family.[6] Nevertheless, we know that sculptors' drawings were already eagerly collected by some contemporaries. Marble statues and drawings alike, works of Giusto Le Court, the foremost Venetian sculptor of the 17th century, nicknamed by contemporaries as "Bernini Adriatico", have been an essential part of the collection of Zaccaria Sagredo.[7] Unlike his Veronese drawings, they probably remain unidentified in museums and private collections. Recent discoveries of some of Le Court's drawings and models for the sculptural decoration of the Monument to Giovanni Pesaro show how important these works can be for understanding of his overall oeuvre.[8]

Sometimes, drawings were made of sculptures in order to prepare prints. Especially with regard to classical sculpture, it became increasingly necessary for artists and connoisseurs to have easy access to the most important items in churches, private or public collections, in Rome and elsewhere. Even modern sculpture was

2 See, for example, P. Rossi, 'Il ruolo della scultura nel *Seicento* e la sua interrelazione con la pittura', in: *La pittura nel Veneto. Il Seicento* (ed. by M. Lucco, Milano: Electa, 2001), 2, 617-644; G. Pavanello, 'Tiepolo e la scultura: dalla copia all'invenzione', in: *Giambattista Tiepolo nel terzo centenario della nascita* (ed. L. Puppi, Padova: Poligrafo, 1998), 1, 165-170; P. Rossi, 'Giambattista Tiepolo e la scultura del suo tempo', in: *Giambattista Tiepolo nel terzo centenario della nascita* (ed. L. Puppi, Padova: Poligrafo, 1998), 1, 171-176; M. De Vincenti, 'Per Giovanni Maria Morlaiter: uno scultore nella cerchia di Sebastiano Ricci', in: *Sebastiano Ricci, 1659-1734* (ed. G. Pavanello, Verona: Scripta, 2012), 375-382.

3 See, for example, many drawings and paintings that include the so-called Bust of Vitellio; an interesting, albeit rather earlier example of actual drawing study with three heads of Vitellio from different points of view by Jacopo Palma il Giovane, see S. Mason, *Palma il Giovane 1548-1628. Disegni e dipinti*, <Venice, Museo Correr> (Milano: Electa, 1990), 39, cat. 2b.

4 See, for example, K. E. Maison, 'The Tiepolo Drawings after the Portrait Bust of Palma Giovane by Alessandro Vittoria', in: *Master Drawings,* 6 (1968), 392-294, 448-460; G. Knox, T. Martin, 'Giambattista Tiepolo: A Series of Chalk Drawings after Alessandro Vittoria's Bust of Giulio Contarini', in: *Master Drawings*, 25 (1987), 158-163, 189-200.

5 For Morlaiter esp. M. De Vincenti, 'Catalogo del "fondo di bottega" di Giovanni Maria Morlaiter', in: *Bollettino dei Musei Civici Veneziani*, 6 (2011), 12-77; for Marinali, for example, S. Carmellini, *Zwischen Steinbruch und Studio: die Bildhauerwerkstatt von Orazio Marinali und Giacomo Cassetti (1683-1754)* (Marburg: Tectum, 2011). Among several recent publications see, for example (for Le Court), M. Clemente, 'Giusto Le Court e i suoi "bellissimi modelli di creta": un'aggiunta al catalogo', in: *Giusto Le Court, due opere ritrovate* (Firenze: Giovanni Pratesi, 2015), 43-63.

6 See Carmellini, note 5.

7 C. Mazza, *I Sagredo: committenti e collezionisti d'arte nella Venezia del Sei e Settecento* (Venezia: IVSLA, 2004), 105; S. Guerriero, "Un disegno di Giusto Le Court nella collezione Certani", in: *Saggi e memorie di storia dell'arte*, 27 (2003), 254.

8 M. De Grassi, 'Un modellino di Giusto Le Court per il monumento Pesaro ai Frari', in: *Arte veneta*, 53 (1998), 124-127; Guerriero, note 7, 251-264; D. Tulić, 'Giusto Le Court e il Monumento Pesaro ai Frari: un bozzetto per i "quattro bellissimi Affricani"', in: *Arte veneta*, 69 (2012), 147-150.

Fig. 2: G. A. Faldoni after Giuseppe Maria Mazza, *Venus and Cupid*, 1708 (Zava Boccazzi, note 12, 321, Fig. 15)

sometimes published as part of larger illustrated publications, and far from being rare are the cases when a sculptor who was not able to go to Rome, used a print rather than a sketch or a model of the original, to produce his version of some important modern statue. This is particularly obvious when prints were made of less precise drawings or even included some iconographical changes. Among the Venetian examples, there is a marble statue of *Saint Catherine*, made in 1699 in Venice by Paolo Callalo, one of Le Court's followers, for the Altar of the Holy Cross in a former Franciscan church in Ljubljana. It was commissioned – together with *Saint James the Greater* – by a wealthy merchant, Jakob Schell von Schellenburg. Callalo based his saint – a patron saint of Schell's spouse Ana Katharina Schell – after a print of Saint Catherine by Benoit Thiboust, which is based on a drawing of a slightly altered *Saint Susanna*, a famous statue of François Duquesnoy in Santa Maria di Loreto of Rome.[9]

In Rome, a significant number of publications in book form was overshadowing a smaller number of single-leaf prints, making them seemingly unimportant. In Venice, the story is different. There were no similar publications of contemporary sculpture in book form, even though similar publications of prints of famous paintings in Venice exist. Sculpture does appear in publications on antiquities, like Scipione Maffei's *Verona illustrata*, which includes in her third part of 1732, a number of engravings by Andrea Zucchi of Tiepolo's drawings,[10] or an illustrated catalogue of the public collection of classical sculpture in Libreria Marciana. The latter was prepared by the two cousins Anton Maria ("di Girolamo" and "di Alessandro") Zanetti in the late 1730s and published in two lavishly illustrated volumes in 1740 and 1743.[11]

9 M. Klemenčič, 'Od Enrica Merenga do Paola Callala: problem avtorstva kipov na oltarjih ljubljanskih kamnoseških delavnic okrog leta 1700', in: *Zbornik za umetnostno zgodovino*, n. s. 36 (2000), 201-202.

10 S. Maffei, *Verona illustrata. Parte terza* (Verona, 1732), esp. 399 ss.

11 A. M. Zanetti, *Delle antiche statue Greche e Romane [...] Parte prima* (Venezia 1740); *Parte Seconda* (Venezia, 1742).

Apart from book compilations, prints of single sculptures were sometimes presented as single-leaf prints. To the best of my knowledge, their position within reproductions of sculpture has not yet been studied thoroughly, and even single prints were only rarely discussed. That means that we are usually not aware of the circumstances of their preparation and printing, we do not know who commissioned them and why, what their function was, and who their public was. In the case of Venice, there are some important prints of larger ensembles containing sculpture, like altarpieces and funeral monuments, but the illustration of sculpture on them often seems to have been of secondary importance to the engravers.

Similar to single leaf prints depicting contemporary sculpture in Venice is an engraving of *Venus and Cupid*, a marble group made by Bolognese sculptor Giuseppe Maria Mazza for the collection of the Manin family. It was not published separately, but as an addition to the journal *La Galleria di Minerva* in 1708 (Fig. 2).[12] Regarding its function, it does connect with examples discussed later here of the work of Antonio Corradini: it was an illustration of a sculpture that was highly praised by contemporaries.

All further examples presented in this paper were published as single leaf prints of the work of Antonio Corradini. Only two were made in Venice, but we will also discuss two later engravings from Vienna and Rome. Corradini, born in Venice in 1688, learned sculpture with Antonio Tarsia and received his first documented commissions in the beginnings of the 1710s. It seems that around 1716, when he was not yet thirty, he quickly rose to fame, and began to work for the most prominent patrons in Venice and abroad.[13] On 12 September 1716, just three weeks after the critical defeat of the Turkish naval fleet at the Island of Corfu, the Venetian Senate chose Corradini for a prestigious commission of the monumental statue of the Marshal Johann Matthias von der Schulenburg. The statue, proudly signed *Antonius Corradini venetus sculpsit*, was finished by the end of the following year and was shipped to Corfu in 1718.[14] The commission itself and the possible public presentation of the statue in Venice must have been extraordinary events since the statue is mentioned in *Diario ordinario d'Ungheria* on 25 December of 1717.[15] A print was made, probably soon after the monument was erected, in 1718, by Andrea Zucchi (Fig. 3), one of the most important engravers in Venice at the time. The author of the drawing is not documented, even though the name of Giovanni Battista Tiepolo has been suggested. The print presents the statue from a viewpoint that underlines the monumental scale of the whole and gives the standing marble figure of Marshall Schulenburg a victorious look. Since we do not know who actually commissioned the print by Zucchi, and the inscription is not clear on this, we can only assume that Zucchi's print was most probably intended to glorify the Venetian victory over the Turks, and probably also to give the necessary merit to Marshal Schulenburg. What does stand out is the detailed and carefully planned depiction of the full-length marble portrait itself.[16]

The years of 1716 and 1717 were a pivotal time in Corradini's career. Most probably at the same time as the Schulenburg portrait, Corradini was able to present to the Venetian public another of his works, the one that made him instantly the most famous of contemporary Venetian sculptors. It was his first depiction of a veiled female statue, the

12 F. Zava Boccazzi, 'I Veneti della galleria Conti di Lucca (1704-1707)', in: *Saggi e Memorie di storia dell'arte*, 17 (1990), 125-126.

13 For Corradini, see B. Cogo, *Antonio Corradini: scultore veneziano. 1688-1752* (Este: Libr. Gregoriana Estense, 1996).

14 P. Rossi, 'Johann Matthias von der Schulenburg e due scultori del suo tempo', in: *Arte veneta*, 70 (2013), 238-241.

15 See *Diario ordinario d'Ungheria* (118, 1717), 12. For the commission and for a suggestion of a public presentation in Venice see Rossi, note 14, 238.

16 See Cogo, note 13, 162-163; for Zucchi, see, for example, L. Trevisan, G. Zavatta, *Incisori itineranti nell'area veneta nel Seicento. Dizionario bio-bibliografico* (Verona: Università di Verona, 2013), 123–124 (with further bibliography).

Fig. 3: A. Zucchi, after A. Corradini's statue, *Marshal Johann Matthias von der Schulenburg*, ca. 1718. Vienna, National Library, PORT_00068509_01

so-called *Donna Velata*. On Christmas Day 1717, not only the report in *Diario ordinario* on Corfu monument was published; on the same day, Antonio Balestra, a well-known Venetian painter, wrote a letter to the Florentine art historian and collector Francesco Maria Niccolo Gabburri. In a short passage, he praised Corradini as a young Venetian sculptor who had made a statue of *Faith* with a veiled face, which managed to "astonish the whole city" because of the translucent veil in marble that covered the face of the statue. The statue is now recognized as the representation of *Faith*, finished by Corradini at the end of 1717 for the monument of the Manin family in the Cathedral of Udine.[17]

Unfortunately, there is no print of this statue, but from this moment onwards, Corradini's career was at its peak, and until the end of the 1720s he was enjoying a position that was rivalled only by that of Giusto Le Court, if we consider the status of sculptors in Venice ever since the death of Alessandro Vittoria and before the era of Antonio Canova. If we consider an engraving of a sculpture, which was already a rare occasion in Venice, as part of Corradini's career, the Schulenburg print is even more extraordinary because of Corradini's young age, and the reason for producing it was probably the historical, political, and military importance of the defeat of the Turkish navy.

The situation was different in the case of the next engraving. In the early 1720s, Corradini was involved in a commission of Scula dei Carmini for their altarpiece in Santa Maria dei Carmini. In 1722–1723, he produced a marble statue of *Virginity*, placed on the altarpiece together with *Humility* by Giuseppe Torretti. Even though Corradini's *Virginity* is not a veiled statue, it stands out in his overall oeuvre and contemporary sculpture as one of the most beautiful adaptations of late Cinquecento works in a modern, Settecento idiom. Its immediate recognition and historical importance are testified to by a single-leaf print, which was produced probably no later than 1724, again by Andrea Zucchi after a drawing by Giambattista Tiepolo (Fig. 4). Here, the function of the print is documented: Zucchi himself, through the inscription below, dedicates the engraving to the famous art collector Zaccaria Sagredo for his promotion of fine arts "with nobility, authority and beneficence." On the print, the statue is taken out of the context of the altarpiece; it remains isolated, and its qualities are again underlined by an excellent drawing, this time signed by Tiepolo. Again, a low viewpoint was chosen to achieve a monumental effect.

As I have been able to show elsewhere, the altarpiece itself, especially the choice of models for the statues carved by Antonio Corradini and Giuseppe Torretti, was probably related to contemporary activities of sculptors in Venice, with the institution of Collegio dei scultori, and the first steps towards an academy of arts in Venice. Sagredo's role in these events is still not clear, but he was an admirer of sculpture, and he owned three

17 See M. Klemenčič, 'Antonio Corradini, Collegio dei scultori, and Neo-Cinquecentismo in Venice around 1720', in: *The Enduring Legacy of the Venetian Renaissance* (ed. by A. Badiee Banta, Abingdon and New York: Routledge, 2016), 103-119, with bibliography.

Fig. 4: A. Zucchi, after G. Tiepolo's drawing of A. Corradini's statue, *Virginity*, ca. 1723-1724. Private collection.

Fig. 5: J. J. Sedelmayr Jr. after J. E. Fischer von Erlach and A. Corradini, *Saint John of Nepomuk*, before 1736. Kunstbibliothek der Staatlichen Museen zu Berlin - Preußischer Kulturbesitz.

crucial works of Corradini, a veiled *Religion* (most probably the one today in the Louvre, Paris), *Adonis* (now in the Metropolitan Museum, New York), and its companion piece *Venus* (remains missing).[18] Still, the reason for Zucchi's choice to present Sagredo with an engraving of one of Corradini's works remains elusive. Was it Sagredo's affection for Corradini's work, was it the fact that both the collector and the sculptor collaborated in the proposal for the Colleggio and Accademia, or something else?

At the peak of his career in his hometown, Corradini left *Serenissima* for the Holy Roman Empire around 1730, and settled in Vienna for a decade, receiving the title of court sculptor by Emperor Charles VI. In the early 1740s, even though his title was confirmed by Maria Theresa, he left Vienna for Rome, where he was, again, among the most celebrated sculptors, receiving distinguished guests in his studio, such as James Stuart, the so-called "Old Pretender" to the British throne, and Pope Benedict XIV himself. Eventually, he left Rome for Naples, where he died in 1752, while working on a demanding project of decorating the private chapel of Raimondo di Sangro, Prince of Sansevero. One of his last works, *Chastity*, as well as his invention of the *Veiled Christ*, carved in marble only after his death by Giuseppe Sanmartino, remain among the most intriguing sights of Naples to this day.[19]

During his time in Vienna, several of his earlier works in Dresden were published as part of Raymond Leplat's *Recueil des marbres antiques* in 1733.[20] At the same time, one more of his Viennese works was

18 See Klemenčič, note 17, 110–116.

19 See Cogo, note 13, 97 ss.

20 R. Leplat, *Recueil des marbres antiques qui se trouvent dans la Galerie du Roy de Pologne à Dresden* (Dresde: Stössel, 1733); Cogo, note 13, 240 ss.

engraved again as a single-leaf print (Fig. 5). It was a presentation of the new monument to *Saint John of Nepomuk* in Prague cathedral. It was executed by engraver Jeremias Jakob Sedelmayr before it was finished. The monument was designed by Joseph Emanuel Fischer von Erlach and Antonio Corradini was commissioned with wooden models for the statues, which were later made by Viennese goldsmith Johann Joseph Würth, and the monument was erected in 1736. The print itself was part of a larger promotional campaign that initially led to the canonization of the saint in 1729 and later to the erection of the new monument. Long inscriptions in both Latin and German presented the main protagonists of the project and were evidently made in connection with the intention to raise money and to further promote Habsburg initiatives regarding Saint John of Nepomuk. The engraving was not directly promoting the artists involved, but their names and status were still conspicuously stressed and were obviously confirming the importance of the project.[21]

When Antonio Corradini came to Rome in the 1740s, he was enjoying celebrity status, but it seems that his fame was not enough to guarantee significant commissions. His activities there and his later move to Naples remain to be studied, as well as his works of the period. The last engraving discussed here will show how Corradini was by this time already aware of the importance that prints could have in attracting the attention of the larger public, including connoisseurs and patrons. In 1743, soon after his arrival to Rome, he made another veiled statue*, Vestal Tuccia*, which remained unsold and was offered to the public through a lottery, perhaps unsuccessfully, since it remained in Palazzo Barberini, where it was on view after Corradini's move to Naples. This time, Corradini

Fig. 6: F. Monaco after A. Corradini, *Vestal Tuccia*, ca. 1743/1747. New York, Metropolitan Museum of Art, 51.501.2714

commissioned himself an engraving, made by Francesco Monaco (Fig. 6). It is not dated but was probably engraved between 1743 and 1747, since the print is dedicated to Cardinal Neri Maria Corsini, protector of the Portuguese crown in Rome. In these years, Corradini was involved in an important Roman commission for the church of Saint Roch in Lisbon, for the chapel of Saint John the Baptist, for which he presented two large marble angels.[22] The engraving of *Vestal Tuccia* is probably the only genuinely self-promotional one of the four prints discussed here, and Corradini's name on the lower left is embellished with his title

21 For the complex story of the monument itself and for the print see F. Matsche, 'Das Grabmal des Johannes von Nepomuk im Prager Veitsdom als sakrales Denkmal', in: *Johannes von Nepomuk 1393–1993* <München, Bayerisches Nationalmuseum> (ed. by R. Baumstark, J. von Herzogenberg, P. Volk, München 1993), 44.

22 Cogo, note 13, 296-303; T. L. M. Vale, *Scultura barocca italiana in Portogallo. Opere artisti committenti* (Roma: Gangemi, 2010), 129 ss.

of court sculptor to Maria Theresa ("her Majesty Queen of Hungary and Bohemia").

The importance of single-leaf prints of Corradini's sculptures should be further discussed in a wider context of similar engravings in Venice and elsewhere. Even when we can assume that such prints have predominately political or propagandistic functions, in general, and that rarely were the artists themselves their publishers, these prints were, in the end, also used as a self-promotional instrument by most ambitious artists. At least in the case of Antonio Corradini it seems that he was able to learn, throughout his career, the possibilities of such engravings, and he used the medium himself when he came to Rome. This corresponds to other proofs of his ambitions and self-promotional activities, which are beautifully phrased in a description of his veiled *Modesty.* On the occasion of its inauguration in the Cappella Sansevero in Naples on July 1752, shortly before Corradini's death, *abate* Filippo Venuti, a Tuscan archaeologist and encyclopaedist, did not fail to observe that the sculptor with his veiled statues became the first artist who had the pleasure of surpassing the famous ancient Greek and Roman sculptors.[23] This statement was, of course, a result of the artistic qualities of Corradini, but it was also a result of carefully planned career moves, among which there was – last but not least – the use of engravings to promote his achievements.

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23 See Klemenčič, note 17, 103-104.

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BERTHOLD'S GUM BICHROMATES IN/AS ARTISTIC PRACTICE

Résumé

Le procédé à la gomme bicromateé était connu bien avant son popularization par les photographes pictorialistes vers 1900. Il était particulièrement proche des techniques néo-impressionniste, de Monet tardive ou divisionniste. Avgust Berthold (1880–1818) était un photographe slovène de renommée internationale, considéré comme le cinquième impressionniste de la tradition artistique slovène. Ses tirages à la gomme bicromateé correspondent aux peintures de ses quatre amis au point qu'il est impossible de dire ce qui était arrivé en premier.

La comparaison des plaques de verre utilisées dans le processus de gomme au bicromate avec d'autres révèle que les plaques destinées au procédé de gomme au bicromate étaient surexposées. Ainsi, le processus de postproduction identifie les intentions artistiques du photographe et de ses amis peintres.

Keywords: bichromate gum print, Slovenian Impressionism, Avgust Berthold, mutual inspiration

Daguerreotype, puharotype, and the gum bichromate process

Like almost any great invention, photography was invented in a search for something else, a perfect reproduction of an image in which a chemical process would replace subjectively guided hand.[1] Thus, the daguerreotype, as well as the puharotype,[2] were unique and singular creations deemed unrepeatable, just like any other work of art.[3] Soon, their claims to art were negated by the extension of the medium to limitless reproduction of (almost) identical images. Even today, there is no universal definition of the medium of photography. The Bressonian punctum disdainfully relegates the dark room part of the process to artisanal execution. Nevertheless, there are photographers who extend the creative process into dark-room wizardry, using the negative, the fruit of the punctum, only as a primary source to interpretation that hypothetically makes each work of art unique and "unrepeatable". Gum bichromate printing

1 S. BANN, *Parallel Lines. Printmakers, Painters and Photographers in Nineteenth-Century France* (New Haven and London: Yale University Press, 2001), 89–92.

2 The term has been coined from the name of Janez Puhar (1814–1864), Slovenian inventor of a particular and still mysterious process of photography on glass plate in 1842.

3 'Images transparentes sur la verre par Pucher', in: *La Lumière*, II, št. 37, Pariz (1852), 147; *La Lumière*, II, št. 40, Pariz (1852), 160 ; M. KAMBIČ, 'Izumitelja Janez Puhar in William Talbot', *Sinteza*, št. 28, 29, (Ljubljana 1973), 27–30.

is part of a process most suitable to the artistic intention of photography, because it is finished in a darkroom by a prolonged postproduction process. Known from the earliest years of photography's history, it was popularized after 1894 by pictorialist photographers.[4] The gum bichromate process allows the manipulation of light and the selective treatment of details towards an articulation of the mood in postproduction that does not necessarily correspond to a snap-shot document. The National Gallery of Slovenia has had the privilege of acquiring several bichromates in recent years but above all to clean and conserve Berthold's photographic plates and make new prints from them.

Berthold's photography and Slovenian Impressionists

Slovenian photographer, Avgust Berthold (1880–1919) probably learned the gum bichromate process at the *Höchere Graphische Bundes-lehr- und Versuch Anstalt*, department of *Photographie und Reproduktionsverfahren* in Vienna in the 1902/03 academic year.[5] It was allegedly Rihard Jakopič (1869–1943), Slovenian Impressionist painter and amateur photographer, who catalysed Berthold's career as a photographer. The school that stimulated experimentation ideally suited the obsessions of the young Berthold. Within three years, he experimented with different plate sizes, with different pigments and tried out landscape, architectural photography, genre, portrait, and the nude in the open air.

In 1904, he exhibited his *Portrait of Jakopič* in Belgrade.[6] This "official" portrait had several experimental predecessors discovered a few years ago in the Jakopič Bequest. Berthold tried differently textured paper supports, varying in grain in black and red pigment and a smoother paper with seemingly lighter red pigment. In contrast to the black-pigmented image, red-pigmented ones are less satisfactory. It is no wonder then that Berthold preferred black, grey, or blue pigments. However, the red-pigmented portrait of Jakopič in an oblong format is a beautiful document of the intimate friendship between the two artists (Fig. 1). In contrast to the others, the portrait is extraordinarily direct, informal, even relaxed and thus a testimony of proximity of the two soulmates.

As a native of Škofja Loka, where painters Rihard Jakopič (1869–1943) and Ivan Grohar (1867–1911) lived at the time, while Matej Sternen (1870–1949) stayed in the nearby hamlet of Godešič, he worked closely with the Slovenian Impressionist painters. Their work lends evidence to the cross-fertilization of painting and photography. Jakopič and Sternen were amateur photographers and used photography extensively as their working tool. It is evident that the painters also used Berthold's photographs for their purposes, and Sternen might have utilized them even in Munich during his winter sojourns. One of the most important Slovenian icons *The Sower*, 1907, by Ivan Grohar was based on Berthold's photograph. Berthold's gum bichromate photo, exhibited in 1906, helped the painter to resolve a pictorial problem laboured on for over a year.[7] Coarse grain, light and shadow

4 The photosensitive property of the bichromates was known in the 18th century. Alphonse Poitevin applied it to photography in 1858 adding pigments to the colloidal solution. An advanced gum bicromate process was introduced and popularized in 1894 by Pierre-Auguste Rouillé-Ladevéze, when he showed his prints at the exhibition of the Paris Photo Club. It was in use until about 1930, especially by the pictorialist photographers. G. BALDWIN, *Looking at Photographs: A Guide to Technical Terms* (Los Angeles: Getty Publications, London: British Museum Press, 1991), 51-52. C. JAMES, *The Book of Alternative Photographic Processes*, Boston, 2015, pp. 58–61

5 Education in Munich and Frankfurt has not been corroborated. His inquisitive nature and the quality of his artistic oeuvre testify to self-education. Among other things he constructed his x-ray camera himself. S. SOSIČ, *Avgust Berthold: fotograf z začetka stoletja*,<*Mestna Galerija,* Ljubljana, junij–julij, *1997*>, *(Ljubljana:Mestna galerija, 1997), 20.*

6 First Yougoslav Exhibition dedicated to the coronation of king Petar I Karadjordjević.

7 T. BREJC, "Groharjev Sejalec / Grohar's Sower", in: *Slovenske Atene 1907-1991 / Slovenian Athens. (premikajoč se po polju slovenske umetnosti kot sejalec / the motif of the sower a challenge to 43 contemporary artists)*, <Moderna galerija, Ljubljana, 22.10.–24.11.1991>, (Ljubljana, Museum of Modern Art, 1992), n. p.

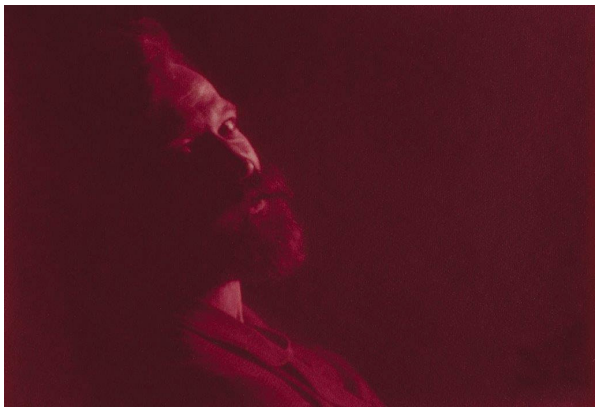

Fig. 1: Avgust Berthold: Portrait of Rihard Jakopič (1904), gum print, National Gallery of Slovenia NG F 213

contrast and softened drawing keen to the late Impressionist and Symbolist painting techniques lead Grohar to an equivocal articulation of the figure and the landscape to encapsulate the ideological identification of the land and the man who works it into an image of the Motherland.

As for Berthold's photography, we should consider first the influence of contemporary Western art that shaped the photographer's vision. His Symbolist landscapes with cropped tree trunks correspond to the compositions of Grohar but even more so the ones by Matija Jama (1872–1947), who as the fourth Impressionist painter was present in Škofja Loka only metaphorically through intense correspondence with Jakopič. Berthold's gum bichromate photographs make us more aware of the share of Symbolism in Slovenian Impressionist painting which makes this local phenomenon so peculiar. In the *Devin/Duino Castle* print, Berthold's trick was the transformation of a daylight photograph into a nocturnal scene (Fig. 2). Berthold's little bichromate was by far the most successful among the known images of the castle, such as a photograph of Fran Vesel (1884–1944) and a painting by Ivan Grohar. The picturesque tourist trap changed into a praying Sphynx looming large in the moonlight over the Gulf of Trieste.

By 1905, Berthold established a photographic studio in a newly-built house in

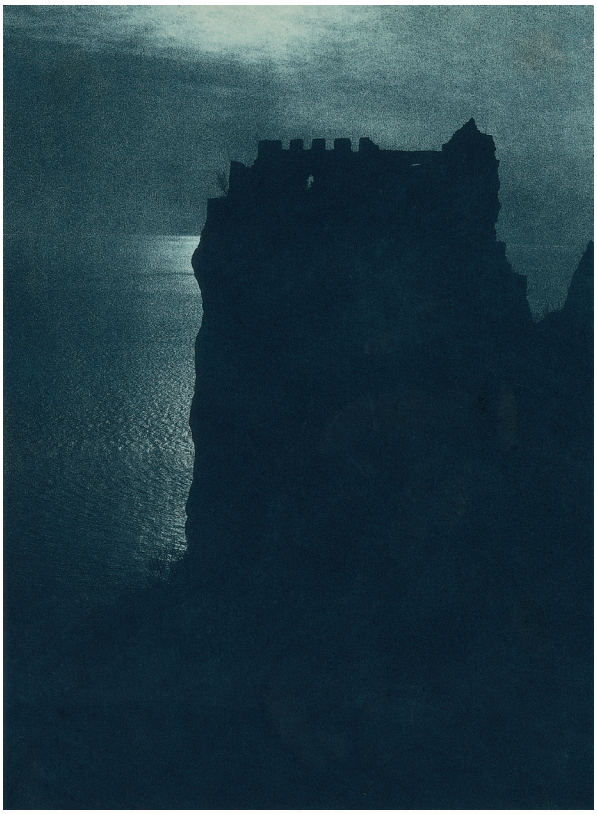

Fig. 2: Avgust Berthold: Devin / Duino, 1905, gum print, black pigment, Private collection

Ljubljana, next to the new Palace of Justice, purchased with lottery winnings. His gum bichromate creations won him medals in international exhibitions in Brussels (1905), Brno (1907) and Oslo (1908). The *First Exhibition of the Slovenian Photo-amateur Club of Ljubljana* in Jakopič Pavilion, 1911, marked his last public appearance as an artist. His inquisitive spirit took him to experimentation with X-rays, and his lack of awareness of the damaging effects of the rays hastened his premature death.

To claim a predilection of the photographer for dawn and dusk lighting effects needs some qualification.[8] So far we have been unable to identify Berthold's plates used in gum bichromate process. However, a careful comparison of the existing negative with the bichromate print of *Devin/Duino* lends evidence that the same negative

8 SOSIČ, note 8, p. 41
S. SOSIČ, "Fotograf Avgust Berthold, slovenski impresionist" in: *Slovenski impresionisti in njihov čas 1890–1920*, ed. by B. Jaki and others, <Ljubljana, National Gallery, April 23, 2008–February 8, 2009>, Ljubljana, National Gallery of Slovenia, p. 208.

Fig. 3: Avgust Berthold: Self-portrait, (c. 1905), gum print, blue pigment, Private collection

was used over a long period of time and even posthumously. Our working hypothesis is that Berthold enlarged his negatives for the bichromate prints in his darkroom. As negatives for contact printing they were redundant, oversize – harder to store, perhaps even useless after serving their purpose, and therefore expendable. Such an enlarged plate was overexposed, losing detail in comparison to the master negative. Despite burned plates, Berthold masterfully manipulated light. In his *Self-portrait* (c. 1905, Fig. 3), he managed to cast it "from the inside" in a counter-light effect just like in the red-pigmented portrait of Jakopič. The *Devin/Duino Castle* is the crowning example of the counter-lit scene that almost incorporates the solar disk, a peculiarity of specific paintings by Jakopič, turned into a mysterious nocturnal drama. A predilection perhaps, but the effects were the fruit of the postproduction, an interpretation that enhanced the photographic plate. This is the meaning of pictorialism: Berthold's intention comes closest to that of his painter friends.

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NIKO KRALJ'S PRESENTATION PANELS DEPICTING HIS DESIGNS FOR THE STOL FACTORY, EARLY 1950s

Zusammenfassung

Die besprechene Präsentationskartons wurden wahrscheinlich verwendet, um Produktprototypen zu bewerben, die Niko Kralj für die Stol-Fabrik entworfen hatte. Zum Zeitpunkt ihrer Entstehung waren sie von sekundärer Bedeutung, da die Fabrik das Design und den Prototyp bevorzugte, sowie die Entscheidung, ob das dargestellte Produkt serienmäßig produziert werden sollte. Aufgrund ihres Alters, ihrer Seltenheit, des Zeitgeistes, der instabilen Techniken und der abgebildeten Produkte sind sie zu einem Gegenstand von außergewöhnlichem Wert geworden. In den 1950er Jahren wandte sich die traditionell starke Holzverarbeitung den Trends zu, die das Bewusstsein für die Lebensqualität in der neuen politischen Ökonomie stärkten und das Design als eigenständigen Beruf förderten. Die vorliegenden Präsentationskartons sind gleichzeitig ein Beweis dafür, daß nicht nur ein technischer Entwurf oder Foto eines Produkts wichtig sind, sondern auch seine plastische Visualisierung.

Keywords: airbrush, photocollage, Niko Kralj, chair, industrial design

Introduction

This study focuses on cardboard presentation panels that show several pieces of furniture in a combination of photocollages and airbrush. The furniture was designed by Niko Kralj, and the presentation panels are kept in the Museum of Architecture and Design (henceforth MAO).

The presentation panels present one of the phases in the complex process of developing an industrial product, which includes sketches, plans, models, prototypes and many other construction and aesthetic checks. When (if) the object reaches its production process, the development processes are often forgotten, or they become unimportant for the public, author and the manufacturer. These panels are therefore a rare existing side-product from the backstage of the creative, production and possibly even sales process of a critical furniture factory, the first in the territory of former Yugoslavia to have introduced a regular work position for an industrial designer: the Stol factory. They represent a valuable document of an essential part of design history, when design in Yugoslavia first became a profession in the 1950s. As the first professional industrial designer in the country, Niko Kralj became an essential factor in the endeavours to establish design as a profession in its own right.

The presentation panels could have been intended for further use: one possibility is that various typographical interventions would be added to create advertisements. If this was to be the case, the "floating" objects and the composition with the mystical void make sense. One thing we know for certain is that they are a result of a precise and targeted creative process. If we assume that they were created for promotional purposes, we have to view the result as an object of visual communication or graphic design.

However, they could be intended merely for an internal presentation, for instance, for the wholesale retailers during a strategic meeting. Alternatively, they could have played a part in the designer's early ambitious attempts to present his prototypes to the management. Only two of the eight objects have been produced in significant volumes: the Rex 120 and the foldable stool.

Aspects of technique

With their combination of techniques and artistic expression, these works represent a novelty in the industrial design collection of Slovenian authors. In our search for comparable material we have failed to find any similar works within the MAO collections or similar institutions in Slovenia. Not merely in the design or technical collections, we have not even found anything similar in the art collections from the early 1950s.

We noticed the presentation panels during our preparations for the Niko Kralj exhibition,[1] as we were systematically cross-checking all available documentary materials. We noticed them because of their contents, but we became especially attentive due to their fragile state, because the photographs were becoming unglued in certain places, and some parts of the cardboard were covered in differently coloured dust patches. Our assumption that these patches are mould will need to be confirmed by experts. Before they arrived at the museum, the presentation panels were stored amongst printed matter and manuscripts in a poorly insulated loft, which was also accessible to rodents. This could be one of the reasons for the stains that appear on all presentation panels.

We are currently discussing the restoration and conservation analysis and procedures with the restoration department at the Archives of the Republic of Slovenia.

Even though they essentially are documentary material, we have – as a result of their rarity, technique and documentary value – categorized them as "musealia" almost seventy years after they were created.

The MAO design collection revolves around awarded objects from the international comparative exhibition Biennial of Design.[2] In accordance with the tendencies at the time,[3] it was originally known as the "industrial design collection", which solely contained finished products. Through the years many other exceptional design products, models and prototypes were added to it.

As MAO is permanently collecting items that could offer an insight into high quality design, larger quantities of unselected materials are occasionally gifted to the museum, which was also the case with Kralj's legacy. As he was the key figure of industrial design in Slovenia, we accepted the entire collection and only later started dividing between the professional and private archive, the latter being returned to his relatives. The objects that remained in the museum were divided into musealia and documentation.

With their discovery, the presentation panels obtained a new value as they depict models or prototypes of models, most of

1 M. Čelik et al., *Niko Kralj: The Unknown Famous Designer*, ed. by B. Predan and Š. Šubic, <Museum of Architecture and Design, 15th December 2011–4th March 2012> (Ljubljana: Museum of Architecture and Design = Muzej za arhitekturo in oblikovanje, 2012).

2 The international comparative design exhibition, organized continuously since 1963, is today known as the Biennial of Design. Since 1972 it has been organized by the Architectural Museum of Ljubljana (today known as MAO).

3 In the 1950s, industrialization was considered to be progress, so design moved from handcrafts and unique items to industrial and large series production.

which have not been preserved. Not only did they become musealia due to their industrial and graphic design value, but they also became a sort of nostalgic and trendy document.

With slight deviations, all eight panels are roughly of the same dimensions and format. With the exception of one that is vertical, all the rest are horizontal panels, slightly larger than A4 format. The technique used is photo collage, in most cases combined with airbrush. In all eight examples, the central object is the presented piece of furniture, which has been manually cut out from a photograph. Six of them have been reworked with dramatic shading, which – in a combination of shadows and the airbrush spray – created a three-dimensional effect. In the other two, which have been glued onto a white background, the shadow of the object was added with cut out raster paper. Six panels used black painted cardboard as the background surface, while the remaining two have a white background surface made from a softer type of cardboard. They were all covered with a thin semi-transparent sheet of tracing paper that was attached to the upper part at the back; however, with some of them, this has been torn off or unglued.

The combination of airbrush and photo collage techniques is impressive. We do not know whose decision this was, nor do we know who made the presentation panels. Taking into account the dramatic positioning they could serve as an advertisement, and it is possible that they were ready for print. The examples on the black background might have been created for a different purpose than those created on the white background, because they are stylistically somewhat different. As a comparison aid, we used expert and general public magazines from the time with contributions on interior design, contemporary design, and advertisements. Looking through the magazines *Arhitekt (Architect)*, *Les (Wood)*, *Naša žena* (*Our Woman*) with the supplement *Naš dom* (*Our Home*) printed between 1950 and 1960, confirmed our assumption that the combination of these two techniques was not used for advertising purposes at the time these panels were created.

Eight presentation panels

In six examples, the object is realistically portrayed with a photograph, surrounded with an imaginary, almost space-like background, as a counterweight to which the object is defined in space with its strong shadow. The two objects presented on the white surface, which are shadowed by the cut our raster paper, are presented in a more two-dimensional way, almost dry and technical in their presentation. In both cases we wonder whether the final presentation panels remained unpublished because professional photographs without any later interventions were simply a better solution. In 1956, the magazine *Arhitekt* published the professional photographs taken by Janez Kališnik,[4] a photographer specialized in photographing design and architecture, alongside a competition report (which was a part of a larger project with the final goal of creating the exhibition *Flat for our conditions*). The quality of his photographs surpassed the artistic expression of our panels in all aspects.

Armchair Rex 120 with a model (Fig. 1) is the only presentation panel to include a person. The purpose of this panel was to show the object's usability, present it in a lively way, in its best light, as three-dimensionally as possible. The figure adds drama, which cannot be found in the other examples. It is compositionally sound –the shadow of the object is cut off – it reaches into the very edge of the panels and beyond. The background has been painted black, while the airbrush spray is white. One can still see that a thin semi-transparent sheet of tracing paper was attached to the top back as protection, but this has been torn off at some

4 'Competition for Rational Furniture', in: *Arhitekt*, 18-19 (1956), 33-35.

Fig. 1: *Armchair Rex 120 with a model*; 24.5 × 21; cardboard, photograph, airbrush. Inv. No. 534:LJU;0037055.

stage. Taking into account the different motif, this could be the result of more frequent use. Alongside the edges of the black surface of the shadow, there are visible traces of drawing pins, which held the stencil in place while the cardboard was being airbrushed. Slight dust stains are noticeable on the top part of the panel.

The presented chair was the first version of Rex that went into mass production. In order to create this chair, Kralj used his patented plywood curved in two directions, which at the time represented a technological as well as design challenge. Contrary to the later, much more popular version, this version was not foldable, but it had a different practical characteristic: the chairs could be stacked. The armrests can be lifted to the backrest which enables one to lower the top chair onto the legs of the bottom chair.

Coffee table (Fig. 2) is the only panel to have a bright shadow to the object. The stencil used to create the shadow was placed against the cardboard before this was painted black, which is confirmed by the traces of the drawing pins. In opposition to the

Fig. 2: *Coffee table*; 24.5 × 33; cardboard, photograph, airbrush, thin semi-transparent tracing paper. Inv. No. 534:LJU;0037060

first piece, this one and all the rest present only the object, which has been extremely precisely cut out from a photograph and glued onto a seemingly endless space, defined merely by the shadow.

In the years of following and researching Kralj's work, we have not come across this object. We have concluded that it must have been made merely as a prototype version. Its special characteristic lies in the upwards turned edges of the table surface. This panel presents important proof of the existence of an object that no longer exists.

On the panel *Chair with a slatted backrest* (Fig. 3), the traces of the drawing pins indicate that the stencil for the shadows was, as was the case in most examples, attached to the already black background. The small object appears somewhat lost within the given format.

The bottom part of the chair is constructed in the same way as the foldable stool, but with an added backrest. The slats that enabled the plywood to be bent into two directions could have become an anatomical and aesthetic feature also in other pieces. This panel is the only presentation of this chair to be found so far.

The size of the depicted *Deckchair Rex* (Fig. 4) stands out in comparison to the format of the cardboard. Compositionally, the author considered the object and its shadow as a whole.

Fig. 3: *Chair with a slatted backrest*; 24.7 × 30; cardboard, photograph, airbrush, thin semi-transparent tracing paper. Inv. No. 534:LJU;0037059

Fig. 5: Rex Chair; 24.7 × 30; cardboard, photograph, airbrush, thin semi-transparent tracing paper. Inv. No. 534:LJU;0037056

Fig. 4: *Deckchair Rex;* 24.7 × 32.7; cardboard, photograph, airbrush, thin semi-transparent tracing paper. Inv. No. 534:LJU;0003593

The dust stains at the top are intense, and they also spread across the photograph and the thin semi-transparent tracing paper. The white stains are less intense. The photograph is very precisely cut out along the slats of the deckchair, and the shadowing shows the same precision. A larger part of the photograph became unstuck over time.

The deckchair Rex was obviously a derivative of the idea with the plywood curved in two directions and the continuation of the parallel slats motif. We cannot judge whether the deckchair prototype was developed at the same time as the Rex armchair or whether the chair already a market success by that time. However, we do know that it was never produced in any large quantities, as the deckchair never appeared anywhere else but in the rare publications of photographs.

The object *Chair Rex* (Fig. 5) and its shadow are once again treated as a whole, for it is the shadow in combination with the airbrush application that is a necessary part of the three-dimensional appearance. Today, a comparable presentation would be created by computer rendering. The same dust stains as before appear along the upper edge. The perforation of the photograph along the sides of the backrest is truly miniscule, and one can still see the airbrush effect through the tiny holes.

The chair is of a squarer shape than the armchair. The improved version went into production, while this photograph clearly shows a prototype.

The brown stains appear predominantly on the black background around the *Little Indian* (Fig. 6) photograph near the backrest, while the white stains appear on the upper and left edge of the cardboard.

From the point of view of its composition, and taking into account the format, the relatively small chair is placed in the centre of the aura, the role of which has in this case almost taken over from the object itself.

Fig. 6: *Little Indian*; 24.7 × 29.7; cardboard, photograph, airbrush, thin semi-transparent tracing paper. Inv. No. 534:LJU;0037058

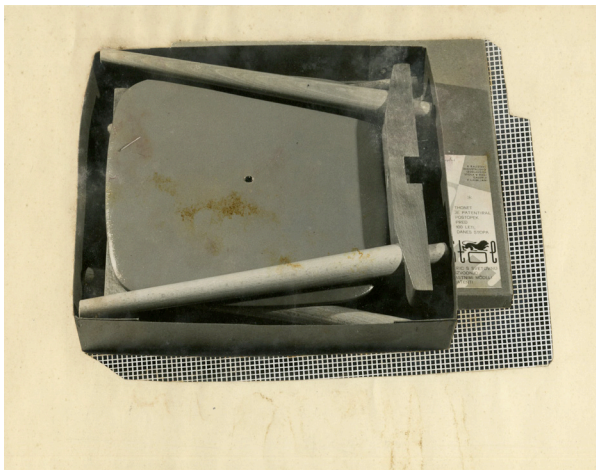

Fig. 7: *Foldable Stool in a box*; 21.5 × 32; cardboard, photograph, raster paper. Inv. No. 534:LJU;0037061

'Little Indian' is a foldable chair. MAO has one prototype with armrests and two without them. One of them carries a production sticker from the factory, which means that at least a small series was manufactured. Technologically interesting is the 'Indian plume' made out of curved plywood leaves, which is supposed to soften the contact between the back and the backrest. This chair never worked statically, which might be the reason that it was never produced in a large series.

Simple photocollage *Foldable Stool in a box* (Fig. 7) does not have a dark background; the base is made from a thinner cardboard, and it has no airbrush interventions. The photograph has a few brown stains and lesions. The depth of field is achieved with the added raster paper alongside the right and lower part of the photograph.

This is the only example that we know to have been published.[5] Compositionally it is not well thought out, but the publication reveals that this was not relevant as only the central motif with the shadowing was used.

The photograph reveals a valuable piece of information: a printed sticker on the box, showing the text "For the exhibition of the industrially manufactured chair in Mala Galerija in Ljubljana" and "Thonet patented the procedure 100 years ago, and today Stol steps ... (along)side it into global ...(pro)duction...own models...(*p*)atents."[6] For this panel, we have a *post quem non* date (i.e., the date of the exhibition).

Niko Kralj was the curator of the exhibition in Mala Galerija between 25 January and 7 February 1954.[7] This sticker indicates that the stool could have been bought there in the box. The stool was deliberately not photographed in its assembled state, but in parts, folded within the box. The trends at the time was to economize with storage and transport space, which led to the do-it-yourself assembly. This was best monetized by Ikea, which started introducing the system at the same time as Kralj. His most famous work – the foldable Rex chair – was created with the idea of the economical use of space. The construction of the stool meant that the user had to tighten a single screw, which is all it took for the stool to achieve total construction stability of a working household stool made from solid wood and curved plywood covered in polyvinyl. Even though it was industrially produced, it has become a rare find.

5 N. Kralj, 'Moderno pohištvo in nove konstrukcije', in: *Les*, 6/7, VI (1954), 101 - 106

6 "K razstavi industrijsko izdelanega stola v Mali galeriji v Ljubljani" ; and: "Thonet je patentiral postopek pred 100 leti, danes stopa Stol ... (*všt*)ric v svetovno ...(*proiz*) vodnjo ...(*l*)astnimi modeli...(*p*)atenti."

7 G. B., 'Razstava »100 let industrijskega stola«', in *Arhitekt,* 11 (1954), 19.

Fig. 8: *Mosquito*; 24.7 × 34.7; cardboard, photograph, raster paper, thin semi-transparent tracing paper. Inv. No. 534:LJU;0037057

In the case of the *Mosquito* (Fig. 8) photocollage, the base is also made from thinner, white cardboard, while the shadow is cut out from printed raster paper. The grey and brown dust stains are the most intense between the photograph and the shadow. The composition is better thought out, but as we had ascertained in the previous example, it is irrelevant.

The sitting surface made from curved plywood is interesting, but represents a construction disadvantage, as it is made from two halves, screwed together on the bottom side of the seat. The four legs and the backrest are also screwed into the same part. The cute shape that gave the chair its name did not truly work in practice. A few prototypes were created, and they can be seen in various publications. It is in production today, with certain construction improvements, but with a worse visual appearance.

Considering a broader frame

In the modern era, the airbrush technique established itself at the end of the 1920s. Man Ray was one of the first artists to use it. By the next decade, this technique had been established in graphic design and was used regularly for decorating everyday objects. Today, it has been substituted in fine art with spray cans,[8] in design by computer programmes, and it is most broadly used for decorating cars and motorbikes.

Art had established a new technique and pathed the way to new implementations in various fields. The same holds true for photocollages. Various types of experimentation with photographs appeared practically at the same time as photography itself. At first accepted as not a very serious artistic expression, photomontages and photocollages were used as a witty idea or a subversion. Man Ray was a pioneer also in this technique, and he was followed by Bauhaus and the penetrating Hannah Höch and Marianne Brandt. Photocollages were at the time so unusual that the artists were considered engineers, for they were seen to build and assemble their works.[9]

Slovene constructivists started using photocollages early on, and they have been long overlooked by conservative public and critics, even though the photocollages by Avgust Černigoj and Eduard Stepančič were reproduced in a special issue of the magazine *Der Sturm* as early as 1929.[10] As regards the contents, they were far from our examples; however, they clearly show that the technique was known in our territory.

As regards the contents, two photographs can be compared to ours, both from Bauhaus. One was made for the needs of promoting Breuer's Wassily armchair and was made by Herbert Bayer in 1927, [11] while the other was made by a Bauhaus student, Erich Consemüller. [12] The older photographs made much better use of the language of photography, its possibilities of expression, including additional interventions. In

8 An example of a work of fine art: Ana Sluga, *Triptych I*, 2016, acrylic and spray on canvass; <Time without innocence, Moderna galerija, 31st January 2019–31st March 2019>(Ljubljana, Moderna galerija, 2019).

9 M. Frizot, *Photomontage. Experimental Photography Between the Wars* (London: Photofile, 1991), 3.

10 *Der Sturm*, 19. Jahrgang / 10. Heft, Berlin, January 1929.

11 *Das Bauhaus. Alles ist design*, ed. by M. Kries et al. <Weil am Rhein: Vitra design museum, 26. September 2015 bis 28. Februar 2016; Bonn: Bundeskunsthalle, 1. April bis 14. August, 2016), 376.

12 W. Herzogenrath, *Bauhausfotografie,* (Bonn: Institut für Auslandsbeziehungen), 46

comparison to them, the lady on the armrest of the Rex 120 seems slightly on the conservative side. Differences should not be sought merely between the authors, but also in the very different spirit of the times in which the compared works were created.

It is a fact that both techniques, the photocollage and airbrush, were practically not used during the 1950s. They became established in fine art in the 1920s, and they experienced a revival only in the 1960s.

With an overview of the graphic design production[13] during the first half of the 20th century, we can conclude that our panels also differ greatly from contemporary graphic design production.

The contents reflect the most creative and original period of the designer Niko Kralj: the first years of his employment in the Stol factory (1952–1955). The panels depict furniture created from curved plywood, which was in step with the contemporary production of the most prominent designers of the period.[14]

Kralj knew what was happening in international design. He was acquainted with the most modern technologies and was sensitive to style changes, which he adjusted to the environment and his expression. Did he consider the presentation panels to be an outdated technique compared to the contents, and is this why they remained hidden from the public?

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13 Ph. B. Meggs, *A History of Graphic Design* (New York: John Wiley & Sons, Inc, 1998).

14 All photocollages are part of the MAO collection.

Melania Zanetti

FROM EAST TO WEST: STUDY, CONSERVATION AND EXHIBITION OF THE *TABULA CHOROGRAPHICA ARMENICA* (17th CENTURY)

Riassunto

La *Tabula Chorographica Armenica* è una mappa di grandi dimensioni commissionata dal nobile bolognese Ludovico (Luigi) Ferdinando Marsili all'intellettuale Eremia Č'ēlēpi K'ēōmiwrčean e realizzata a Costantinopoli nel 1691. Scritta in armeno e riccamente dipinta, conservata presso la Biblioteca Universitaria di Bologna (BUB), è una rappresentazione cartografica dei luoghi sacri sorti in Armenia tra il IV e il XVII secolo, progressivamente ridotti in rovina dalle continue invasioni e, infine, dalla spartizione del territorio tra gli imperi ottomano e persiano.

La richiesta del Metropolitan Museum of Art di New York di esporre la *Tabula*, ha rappresentato per la BUB l'occasione per realizzarne il restauro "in pubblico" e avviare un programma di studio e valorizzazione di quest'opera, tanto importante quanto ancora poco nota.

Keywords: Armenian worship sites, map conservation, scroll preservation, three-crescent watermark, Ludovico (Luigi) Ferdinando Marsili, Eremia Č'ēlēpi K'ēōmiwrčean.

The *Tabula Chorographica Armenica*

From September 2018 to January 2019, New York's Metropolitan Museum of Art (MET) hosted an exhibition dedicated to Armenian culture and its rich heritage of artefacts. Among these was the *Tabula Chorographica Armenica* from the Biblioteca Universitaria of Bologna (from here on referenced simply as BUB) displayed in the United States for the first time (Fig. 1).

The *Tabula* is an oversized map (more or less 3580 × 1200 mm) in the form of a scroll and contains a vertically organized presentation of the historical sites of worship in the Armenian tradition through miniatures and legends written in classical Armenian.

It is a significant work for several reasons. First, it is distinctive on account of two extended annotations found at the map's top and bottom margins (Fig. 2). Here the author gives information about himself, the commissioner, where and when the map was made and what it represents.

The author of the map is the Armenian intellectual, Eremia Č'ēlēpi K'ēōmiwrčean, born in 1637 in Constantinople, capital of the Ottoman Empire and since 1461 the site of an important patriarchate aggregating the large resident Armenian community. K'ēōmiwrčean was fluent in

Fig. 1: *The Tabula Chorographica Armenica* shown at the MET (Photo by Sara Mantovani)

several languages (Greek, Latin, Turkish), authored works of history, geography and cartography,[1] and maintained contact with many well-known intellectuals of the time.

The commissioner was a nobleman, born in Bologna in 1658, Ludovico (Luigi) Ferdinando Marsili, serving in the imperial army of Leopold I of Augsburg, at the time engaged in pushing back against the Ottoman expansion into Europe. Marsili was a cultured general, with interest in many fields, from geography and natural phenomena to botany, antiquarianism and the customs of the peoples and places he encountered.[2]

In 1691, Ludovico Marsili was in Constantinople on a diplomatic mission for the emperor. His questions to Eremia about the most important sites of the Armenian Christian tradition provide the opportunity for the creation of this map, born of the collaboration between Eremia and his youngest son, Malak'ia, a talented miniaturist of manuscripts.

1 H. Margaryan, 'Characteristic Features and Periodic Classification of the Medieval Armenian Historiography', in: *Journal of Armenian Studies*, 1 (2013), 53. The author underlines the fact that Eremia Č'ēlēpi K'ēōmiwrčean wrote an Armenian historiography, which he then translated into Turkish. The original has been lost, so the Turkish version remains fundamental in understanding Armenian history.

2 D. Clementini, *Luigi Ferdinando Marsili. Viaggio nelle scienze*. (Doctoral thesis in philosophy, XIX cycle, University of Bologna, 2007), 60-72.

Fig. 2: *The Tabula Chorographica Armenica*, recto: in evidence the annotation by the author at the map's top and bottom margins (Courtesy of Biblioteca Universitaria, Bologna)

The *Tabula* is unique in being the first map handwritten in Armenian[3] and in the fact it displays a comprehensive overview of the traditional sites of worship of the historical Armenian territory from the 4th to the 17th centuries. It depicts hundreds of monasteries, convents, hermitages, and the main ecclesiastical centres – including the patriarchates of Constantinople and Jerusalem – all the way from the first conversion to Christianity due to Saint Gregory the Illuminator and his anti-pagan preaching at the turn of the 4th century.

The map is clearly not intended as a travelling tool: it shows no geographical realism, there are no metric reference points or indications of latitude and longitude, and the spatial orientation is typically Medieval: east at the top, south to the right, west at the bottom, north to the left.

Eremia Č'ēlēpi K'ēōmiwrčean's description is thus not based on his direct experience or the physical reality of these sites, but rather on traditional accounts, both oral and written.[4] When K'ēōmiwrčean and Marsili met at the end of the 17th century in Constantinople, many of these places of worship, spiritual retreat, and pilgrimage had been destroyed or severely damaged by continuous invasions and the resulting border changes up to the division of the land between the Ottoman and the Persian empires in 1605.[5]

Having lost its political autonomy, the Armenian identity becomes increasingly tied to the deeply rooted Apostolic Church: its capillary presence and organization created continuity through the centuries, despite political and territorial changes.

Finally, the *Tabula* is made more precious by the fact it was rediscovered only in 1991 amidst the materials of the Marsili Collection in the BUB after it had been thought to have been lost for nearly 300 years.

The *Tabula Chorographica Armenica* in the Marsili Collection

When Marsili returned to Bologna in the spring of 1692, he brought the *Tabula* back with him. In 1712, after the end of his military career, the count founded the Istituto delle Scienze e delle Arti (Institute of Arts and Sciences) in Bologna, to which he donated the greater part of his collections. Marsili himself mentions the *Tabula* in his handwritten inventory (ms 421):[6] the map is number 100 on the list and described as "hanging on the wall of the Institute library".[7]

When the institute library became the Biblioteca Universitaria di Bologna, the rich heritage of objects, books, and maps ended up in the "Marsili collection" of the BUB. However, the *Tabula* was not in the official catalogues of the BUB up to the inventory written in the 20th century by Ludovico Frati, responsible for the manuscript collection. He recorded map no. 24 among the scrolls of the library under the title *Tabula Chorographica Armenica,* which it keeps to this day.

In 1991, an exhibition provided the opportunity to look more closely at scroll no. 24. Thanks to the contributions of Gabriella Uluhogian, professor of Armenian culture, and her translation from classic Armenian to Italian, the map's importance has come to light.

3 R. Galichian, *Historic Maps of Armenia. The Cartographic Heritage. Revised and Abridged* (London: Bennett & Bloom, 2014), 76.

4 Uluhogian Gabriella, *Un'antica mappa dell'Armenia. Monasteri e santuari dal I al XVII secolo* (Ravenna: Longo editore, 2000), 39. The author notes how the general structure of the work and the legend text particularly refer back to the work of Vardan Arewelc'i, author in the 13th century of a geography (Asxarhac 'oyc'), which widely spread and copied in the following centuries.

5 Just to give an example, identifiable on the *Tabula* is lake Van, a large saltwater basin surrounded by the monasteries that replaced the pagan temples after the conversion to Christianity. Together with the lakes Sevan and Urmia, traditional sources list it as one of the three seas of Armenia: today it is located in Turkey, lake Sevan is in the Republic of Armenia and lake Urmia is part of Iran.

6 B. U. B., ms 421, «*Inventario dei codici mss., mappe ed altri recapiti donati dal Gen. Co. Luigi Ferdinando Marsili all'Instituto delle scienze di Bologna, riformato, corretto e accresciuto oltre quello che era l'inventario registrato nella donazione*».

7 L. Miani, 'L. F. Marsili e la Tabula Chorographica Armenica (rot. 24) della Biblioteca Universitaria di Bologna', in: G. Uluhogian, *Un'antica mappa dell'Armenia. Monasteri e santuari dal I al XVII secolo* (Ravenna: Longo editore, 2000), 17.

The artefact

The request made by the Metropolitan Museum to display the *Tabula Chorographica Armenica* became a chance to verify the artefact's condition. This produced a considerable quantity of material data neglected up to that point in favour of its textual understanding.

The shape of the *Tabula* is irregular, like an upside-down bottle, wider at the top (1190 mm) and progressively narrower towards the bottom (880 mm). It is composed of 16 juxtaposed sheets of laid papers, uniform in quality and dimensions (about 450 × 620 mm each),[8] placed alongside each other in pairs and aligned in eight rows.

From top to bottom, in the first eight sheets, the chains are placed vertically, and the laid lines horizontally; in the next four sheets, the chains and laid lines are placed in the same way, but the paper dimensions are altered by trimming to create the bottleneck effect. The last four papers go back to regular dimensions, but the laid lines are vertical and the chains horizontal.

A three-crescent watermark is visible on almost six sheets, confirming the use of paper of the same quality (Fig. 3). The peculiar structure of the artefact is thus not casual and precedes the authors' intervention, a fact also testified by the continuity of graphic marks even in the areas of juncture between different sheets.

It is well established that the watermark known as *tre lune* originated in Italy for paper destined for export to Arab regions. In the second half of the 17th century, Constantinople hosted many Armenian printing

Fig. 3: The three-crescent watermark, grazing light (Photo by the author)

presses, and because of the lack of local manufacture, it is mostly through Venetian trade routes that printers obtain the paper, inks, and materials necessary to produce books.[9]

The quality of the media (ink, gold and a variety of colours) is thus that none of them produced instability or damage to the paper; the tonalities are bright, and their adhesion to the paper is excellent. The fact that the map was preserved rolled up and away from light sources, which is the most serious cause of corruption for colours and pictorial binding agents, contributed positively to the general conditions of the work.

A lining cloth is on the back of the *Tabula,* made up of six pieces of varying dimensions stitched together.[10] The dimensions of the cloth are a few centimetres greater than that of the paper map, and its borders remain unrefined and subject to fraying. Gelatine was used for the lining: in a few points, damage sustained by the cloth reveals the glue and the paper underneath it.

8 The dimensions of the single sheets seem to correspond to the Realle format of the well-known Bolognese decree defining in 1389 the official dimensions of the four types of 'carta bombagina', that is: Imperialle (Imperiale) 500 × 740 mm, Realle (Reale) 450 × 620 mm, Meçade (Mezzano) 350 × 520 mm and Reçute (Rezzuto) 320 × 450 mm. They were rapidly adopted as the standard in the production and commercialization of Italian and also European paper until the rise of industrial production in the 19th century. – *Testa di bue e sirena. La memoria della carta e delle filigrane dal medioevo al seicento,* ed. by P. Rückert (Stuttgart: Landesarchiv Baden-Württemberg, Hauptstaatsarchiv, 2007), 19.

9 M. Pehlivanian, 'Mesrop's Heirs: the early Armenian book printers', in: *Middle Eastern Languages and the print revolution: a cross-cultural encounter*, ed. by E. Hannett-Buzz and others (Westhofen: Skullma, 2002), 53-64.

10 Dimensions of the pieces of cloth, from the top one (the widest) to the final one: the first piece measures 685-695 × 1205-1220 mm; the second piece measures 700 × 1220 mm in the widest part and 700 × 1215 mm at the lower end, which is narrower; the third piece measures 700 × 1220 mm in the widest part and 690 × 1180 mm (the seam is not straight) in the narrowest; the fourth piece measures 685 × 1170 mm in the widest part and 685 × 905 mm in the narrowest; the fifth piece measures 695 × 905 mm in the widest part and 695-700 × 900 mm in the narrowest; the sixth piece is very short and measures 165-168 × 900 mm in the widest part and 165-168 × 895 mm in the final part, the lower extremity of the *Tabula*.

Fig. 4: Indented shape lacunas repaired in the past (Photo by the author)

The lining is evidently from after 1691, the year in which the *Tabula* was made. This can be gleaned from the many *lacunas* visible on the map's sheets: their indented shape points to rodents, and in any case, none of them extends to the cloth. They were repaired by fillings made of paper, pasted to the back some time before the lining of the map (Fig. 4).

Small holes can also be observed at regular intervals along the entire perimeter of the *Tabula*, sometimes evident only on the cloth, at other times passing through both the paper and the cloth and stained with rust, signalling the use of iron nails, probably used to hang the map on a wall, as stated by Ludovico Marsili.[11]

The cloth also bears the number 100, which is how the map is indicated by Marsili in the same manuscript, and the title *Tabula Chorographica Armenica,* written close to the top margin of the map.

The conservation project

In 2018, I had the chance to examine the *Tabula Chorographica Armenica* and agreed with the scientific coordinator of the BUB and the library curators for a minimally invasive intervention to improve its general conditions so that it could withstand the transfer to and exhibition in New York without further risks.

Incoherent deposits and dust had accumulated; the edges had detached from the cloth in many different points and presented tears and holes: some had been created by rodents, others were due to the stress-induced by unfolding and rolling up the map and were in danger of more fragmentation.

As already mentioned, the *Tabula* was rediscovered only in 1991, and since then there have been few occasions for its study or display to the public. We did not want to remove the map from consultation to send it to an external laboratory; we thought that the conservation intervention could become an opportunity to promote awareness of this work, in the firm conviction that interest and care for our cultural heritage can develop only when directly faced with its uniqueness. It was therefore decided that the conservation treatment would be done "in public" in the library itself, although that meant reorganizing spaces and involving the security staff.

This option brought with it considerable advantages. First, in addition to giving visitors the opportunity to see the intervention itself, specific study days were promoted for the public.

Second, the open collaboration between the conservator and the library curators made possible an ongoing modulation of the methods and results of the intervention.

At the same time, the risks involved in moving the artefact and the microclimatic variations during the transport and permanence in a place different from the library were avoided.

Finally, the constant dialogue between the library curators, the conservator, and the people responsible for the "Armenia!" exhibition at the MET decided how the work would be exhibited in New York. The initial idea at the MET was to hang the map vertically on the wall, but it became apparent in dealing with the public that the legends and miniatures could only properly be seen with the map in a horizontal position.

A room (Aula IV) was specially set up to carry out the conservation treatment.

It is a space shared between the BUB and the adjacent Museum of Palazzo Poggi,

11 L. Miani, note 7, 17.

Fig. 5: Reattaching the raised edges of the map to the lining using starch paste (Photo by the author)

the ancient seat of the Istituto delle Scienze e delle Arti founded by Ludovico Marsili. Aula IV used to be the library of the institute, and it can be reached both from the entrance of the BUB and from that of the museum.

One of the three long (6 metres) display cases in the room was covered with a soft table pad and non-woven fabric and became the map's support surface during the intervention.

The microclimate was permanently under control in Aula IV; thermo-hygrometer values appeared to be generally appropriate, with an average temperature of 24°C and a fairly constant relative humidity of around 50%. As for lighting, we modulated the spotlights' intensity: appropriately oriented, they cast about 300 lux on the surface of the *Tabula*. This seemed to be an acceptable compromise between the light intensity required to carry out the intervention and the one recommended for exhibitions of such a delicate work of art on paper; certainly enough to allow visitors to appreciate the *Tabula* even at a proper distance. We also verified the ultraviolet (UV) radiation incidence, which was of 20 microwatt/lumen, which is in the range of the minimum UV quantity emitted by artificial lighting.[12]

12 Canadian Conservation Institute, *Measurement of Ultraviolet Radiation – Canadian Conservation Institute (CCI) Notes 2/2* https://www.canada.ca/en/conservation-institute/services/conservation-preservation-publications/canadian-conservation-institute-notes/measurement-ultraviolet-radiation.html

The conservation treatment took about three weeks, in the period of May 8–26, 2018.

The map was first dry-cleaned. Soft brushes and smoke-off sponges (rubber latex vulcanized) were used by dubbing on the marking-free areas of the recto to render the contrast between support and drawings more vivid.

The raised edges of the paper were reattached to the lining using wheat starch paste (Fig. 5), and Japanese long-fibre papers were selected to realign tears.

In the case of *lacunas*, the advisability of filling was assessed case-by-case with the curators. Some of them, located on the perimeter of the work, were due to incautious handling and to the stress that was induced when rolling and unrolling the scroll. They were irregular in size and shape and could have expanded and degenerated into new tears and fragmentations, compromising larger portions of text and drawings, as was already the case for both corners of the upper side of the *Tabula*. These *lacunas* were thus filled with starch paste and Japanese paper and toned with watercolour pastels to make it less visually jarring on the map.

In contrast, the indented *lacunas* caused by rodents were not treated, and we also decided not to remove the repairs adhered in the past to the back of the artefact. Similar considerations were made for the holes along the perimeter of the map, taking care not to alter their morphology and not to obliterate the oxide stains caused by the missing iron nails: in the absence of further information on the historical vicissitudes of the map, we avoided altering this material evidence.

The dimensions of the lining cloth exceed those of the map on each side, and this is a good form of protection for the paper; however, the operations of rolling and unrolling the artefact are always complex. Even when the map was laid flat, its upper and lower extremities tended to roll up again and needed to be kept on the ground with weights, usually placed on the edges of the cloth but sometimes also on the map

Fig. 6: Preparing the flap in Japanese paper to be pasted on one of the map's margins, verso side (Photo by the author)

surface. To prevent the lining cloth from being improperly used, a Japanese paper flap (200 mm wide) was pasted to the edges of the cloth on both of the short sides of the *Tabula*: as a result, the paper and the adhesive modified the weight of the cloth, preventing further curls; moreover, the flaps increase the support surface for any weights and make the rolling up of the map easier (Fig. 6).

Promotion activities

The conservation project was coupled with intense activity aimed at promoting the *Tabula Chorographica Armenica* and the historical and cultural context in which it originated. The initiative, organized by the University Museum System, by the Biblioteca Universitaria di Bologna and by the Department of History, Culture and Civilization of the University of Bologna, was sponsored by the Embassy of the Republic of Armenia in Italy and involved collaboration between institutions and scholars.

From the beginning (8th May), the conservation project was presented to the public, introducing the textual and material analysis of the work (Anna Sirinian, professor of Armenian history and culture at the University of Bologna) as well as the methods and objectives of the conservation intervention (myself).

Since the University of Bologna was the first seat of an Armenian Studies chair in 1973[13] and has significant cultural exchanges with members of the Armenian community, on 10th May the BUB hosted the conference "Marsili's Armenian Map and the Armenian treasures of the University Library of Bologna", which was attended by scholars from University of Bologna (Anna Sirinian), from the Institute of Ancient Armenian Manuscripts "Matenadaran" of Yerevan (Khachik Harutyunyan),[14] and from the Academy of Fine Arts (Nazenie Garibian) of Yerevan. The theme was the relationship between the *Tabula* and the production of handwritten and illuminated Armenian works of fundamental importance.

Aula IV, where the conservation intervention took place, was included in the visit to the Museum of Palazzo Poggi. Precautions were taken to maintain a proper distance between the public and the work, so as to limit any significant alteration of the microclimate close to the map by the presence of large crowds. However, greater proximity of the work was allowed during four specially booked visits for groups of 20 persons each (Fig. 7). The BUB scientific coordinator, Giacomo Nerozzi, professor Anna Sirinian, the special collection curator Sara Mantovani and the conservator (myself) accompanied

13 From 1973 to 2013, the Armenian Language and Literature chair at the University of Bologna was held by Gabriella Uluhogian, who studied and translated the text of the *Tabula Chorographica Armenica* from Armenian into Italian.

14 The Matenadaran or Mesrop Mashtots Institute of Ancient Manuscripts is a research institute and museum in the capital of the Armenian Republic, Erevan or Yerevan or Jerevan, and it hosts the most important collection of Armenian manuscripts.

Fig. 7: One of the specially booked visits for groups in Aula IV (Courtesy of Biblioteca Universitaria, Bologna)

the groups through a "reading" of the *Tabula* and its rich drawings, a structural analysis of the multi-material artefact and to the observation of the conservation treatment in progress.

In May, the Museum of Palazzo Poggi recorded approximately 2530 visitors[15] who had the chance to see this exceptional cartographic work, kept in Bologna since the end of the 17th century but almost unknown and for a very long time thought altogether lost.

Ready for the Metropolitan

The conservation project included an *ad hoc* box, suitable both for long-term storage, guaranteeing the map protection against the risks that may arise during handling (impacts, shocks, etc.) and stable thermo-hygrometric conditions during transfer. This phase of the project took shape through the dialogue between the library curators,

15 Data registered by the University Museum System (SMA).

Fig. 8: The *Tabula* rolled up in the cardboard cylinder. On the right, the flap in Japanese paper at the map's top margin, support surface for weights (Photo by the author)

the conservator and the company that produced the box.

Until the conservation intervention, the *Tabula* was kept in an anonymous cardboard tube whose diameter (14 cm) forced the map to be rolled up tightly to reduce its size. By opting to keep the map in the form of a scroll, it was provided with a support structure for when it is rolled up, a cardboard tube suitable for preservation with a diameter of 150 mm and a length of 1400 mm (Fig. 7). These dimensions allow for eight comfortable folds of the map, a number considerably lower than that to which it was previously forced for storage in the old cylinder.

Thus rolled up, the *Tabula* is housed in a 250 × 250 × 1400 mm case (base and lid) made of corrugated cardboard in pure cellulose, with alkaline pH and a buffer reserve. The inner compartment of the case is lined with expanded ethafoam, shaped so as to form a cradle for the map, which remains contained and protected even in case of handling.

The upper part of the cradle has windows to allow for inspection of the map; in the ethafoam are compartments for the datalogger necessary for thermo-hygrometric detection and the humidity stabilizing silica gel (Fig. 9).

After the conservation treatment, the *Tabula Chorographica Armenica* was housed in its case together with silica gel and a datalogger. It was then packed up in September for the flight to the MET,

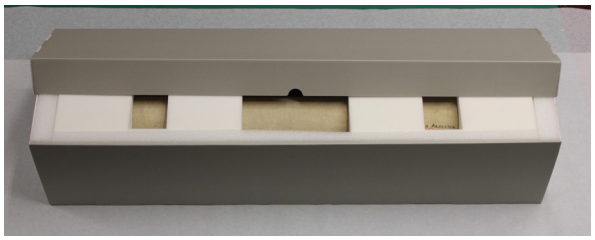

Fig. 9: The *Tabula* housed in its case (Photo by the author)

accompanied by the special collection curator of the BUB.

It was her task to follow the work during its transportation, from preparation for the flight to the transfer to the MET, as well as the phases of unpacking and preparing the *Tabula* for exposure and, above all, to make sure that the display modalities were adequate for the preservation needs of the delicate artefact.

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HERBERSTEIN'S *GRATAE POSTERITATI* (1560) IN PTUJ AND BRNO: COMPARISON OF THE COLOURING MATERIALS USED ON WOODCUTS

Zusammenfassung

Der Artikel präsentiert einen Vergleich der Elementzusammensetzung von Farbstoffen, die für handgefärbte Holzschnitte in der Ptuj und Brno Kopie des Herberstein Buchs benutzt wurden. Gedruckt wurden sie 1560 in Wien und werden gegenwärtig in der Ivan Potrč-Bibliothek in Ptuj und in den Moravian Provincial Archiven in Brno aufbewahrt. Die in der Ptuj Kopie verwendeten Pigmente wurden durch die PIXE Methode analysiert, für die Brno Kopie wurde die XRF Methode benutzt. Die Methoden sind zwar unterschiedlich, dennoch eignen sich beide um Metall-Ionen in Farbstoffen auf Pergament und auf Papier zu erkennen. Die Ergebnisse zeigen die Verwendung von vergleichbaren Pigmenten, jedoch wurden individuelle Unterschiede zwischen beiden festgestellt.

Keywords: Sigismund von Herberstein, Ptuj, Brno, PIXE, XRF, colouring materials, elemental composition

Introduction

This paper presents a comparison of the elemental composition of colouring materials used on the woodcuts in the Ptuj and Brno copy of Herberstein's book *Gratae posteritati*, printed in Vienna in 1560 and currently kept in the Ivan Potrč Library in Ptuj and in the Moravian Provincial Archives in Brno. The book is a crucial contribution to the diplomatic and political history of 16th-century Europe.[1] In addition to the Latin copy in Ptuj and the German copy in Brno, another seven (Latin and German) copies are known to exist. Other than the Ptuj copy, two more Latin hand-coloured copies exist in London.[2] As far as is known, only the Ptuj copy has serious damage due to iron gall and copper pigments combined with long-term exposure to humidity.

The Ptuj copy *Gratae posteritati* is kept in the Ivan Potrč Library in Ptuj (a second edition of the work, printed by Raphael Hoffhalter in Vienna in 1560[3]). In the past, it formed part of the Herberstein family

1 D. Zadravec, 'Rodbina Herberstein in njen najznamenitejši član Žiga baron Herberstein/The Herberstein Nobility and Its Most Prominent Member, Sigismund von Herberstein', in: *Gratae posteritati: študijska izdaja* (Ptuj: Knjižnica Ivana Potrča – Maribor: Umetniški kabinet Primož Premzl, 2014), 232-233.

2 Two hand-coloured copies of Hoffhalter's Latin edition from 1560 are in London, one at the Victoria and Albert Museum (shelfmark: 86.B.67) and the other in the British Museum in London (Grenville Library, G. 7215).

3 The first edition was published in 1558.

legacy.[4] The Ptuj copy consists of printed text and illustrations. The textblock consists of 120 pages (i.e., 60 leaves arranged in 15 quires[5]), measuring 281 × 179 mm. The binding (290 × 187 × 13 mm) in red velvet is not contemporary. The textblock edges were trimmed considerably in the past, probably when the book was rebound in the late 19th or early 20th century. Due to serious damage, conservation treatment was necessary.[6] The illustrations comprise two prints of the Herberstein family's coat of arms (page 2r coloured and page 61r black and white), six etchings (pages: 6v, 7v, 8v, 10r, 10v, 19v, and one woodcut (page 11v) depicting the profiles of prominent European leaders of the time, six full-page woodcut portraits of Sigismund von Herberstein[7] in ceremonial garb (pages: 8r, 9v, 12v, 14v, 18r, 18v) and two smaller woodcuts (8v and 17v).[8] Detailed descriptions are presented elsewhere.[9]

The Brno copy of the Herberstein autobiography is the German version, printed in Vienna in 1560 by Raphael Hoffhalter[10] and kept in the Moravian Provincial Archives in Brno.[11]

The Brno copy also consists of printed text on paper with hand-coloured illustrations, but the structure of the printed text and the illustrations differ from those of the Ptuj copy.

The textblock consists of 26 leaves arranged in 7 quires – biniums (280 × 190 mm). The binding cover (285 × 205 × 14 mm) is in brown tanned leather decorated (blind-tooled) with the central oval decoration, which was gilded. The textblock edges were not trimmed as at the Ptuj copy, and the book was probably rebound, but the date is not known. The illustrations comprise one print of the Herberstein family's coat of arms (fol. 1r), six full-page woodcut portraits of Sigismund von Herberstein in ceremonial garb (fols. 11r, 12r, 15v, 16v, 19r, and 20v), seven profiles of prominent European leaders of the time, seated figures of the Turkish Sultan Suleyman and the Russian Tsar Wasil, three coloured scenes from travels, a coloured picture of a Turkish camp, a coloured picture of Russian sleds (all on the fol. 23r) and the map of Moscovia dated 1557 (fols. 25r and 26v).

Working method

For the analysis of the elemental composition of colouring materials used in the hand-coloured woodcuts of the two copies of Herberstein's book, two analytical methods were applied: proton-induced X-rays (PIXE[12]) for the Ptuj book and X-ray fluorescence (XRF[13]) for the Brno book.

4 In the Middle Ages, the Herberstein nobility had an immense impact on the history of the area between the Alps, the Danube River, the Adriatic, and far beyond. They indirectly contributed to the current image of this part of the world and society through audacious military activities, intellectual engagement, and scientific and artistic achievements.

5 A quire (or gathering): a group of folded leaves; quires sewn together with other quires form a textblock.

6 The first conservation treatment in 1986/86 and the second in 2013 – SI ARS CKR Ev.n.: 12/107.

7 Sigismund von Herberstein (*Vipava/Slovenia 1486–†Vienna 1566), humanist, polyglot, cosmopolitan, and diplomat in the service of the Habsburg dynasty. He had a brilliant career and contributed greatly to the social advancement of his family. His most popular work (published in Latin, German, and Italian) is *Notes on Muscovite Affairs*, printed in Vienna 1549 and 1557, Venice 1560, Basel 1551 and 1563, and Antwerp 1557.

8 A detailed structural analyses of the copy and a schematic presentation of the conservation treatment are presented elsewhere. J. Vodopivec, 2014: 256–274 and J. Vodopivec, Ž. Šmit, H. Fajfar, 2016: 48 – 57.

9 J. Vodopivec et al., 'Ptujski Gratae posteritati, 1560: struktura, materiali, poškodbe in posegi/The Gratae Posteritati Edition Stored in Ptuj, 1560: Structure, Materials, Damage, and Conservation and Restoration Work', in: *Gratae posteritati: študijska izdaja* (Ptuj: Knjižnica Ivana Potrča – Maribor: Umetniški kabinet Primož Premzl, 2014), 256-276.

10 P. Vidmar, 'Diplomat in njegova imenitna oblačila: ilustracije v Herbersteinovih Gratae Posteritati /The Diplomat and His Valuable Robes: Illustrations in Herberstein's Gratae Posteritati', in: *Gratae posteritati: študijska izdaja* (Ptuj: Knjižnica Ivana Potrča – Maribor: Umetniški kabinet Primož Premzl, 2014), 235.

11 Moravsky zemský archiv v Brně, G 140, 2908(83/a, Vlastni životopis sv. P. z. Herbersteina avtobiografija.

12 PIXE: Proton Induced X-ray Emission. The application of PIXE to organic objects is possible for the analysis of objects composed of organic materials with inorganic components as impurities or additives, and for the analysis of surface layers such as inks, pigments, and all sorts of inorganic inclusions or impurities.

13 XRF: X-ray Fluorescence Analysis. This method is based on the emission and detection of so-called characteristic

The Ptuj illustrations were measured on 26 August 2014 using proton-induced X-rays (PIXE), using the in-air proton beam of the Tandetron accelerator of the Jožef Stefan Institute in Ljubljana. A detailed description is presented elsewhere.[14]

XRF analysis of the Brno illustrations was performed on 8 November 2017 using a laboratory micro-XRF device constructed at the Czech Technical University in Prague. A detailed description of the micro-XRF setup is presented elsewhere.[15]

In both cases (Ljubljana and Prague), the same amount of points in the same places in the Ptuj copy and the corresponding points in the Brno copy were analysed.

Results and discussion

The two books (Ptuj and Brno) differ in the structure of the textblock and in the arrangement of the illustrations. (Figs. 1a–4b) In both of them, all six full-page hand-coloured woodcuts depicting Herberstein in ceremonial garb are present. As a result, we were able to draw a comparison of these six full-page woodcuts in both copies. Due to limitations of space, we present here just four illustrations and the comparison of the results of the analyses of the elemental composition of the colouring materials in the Ptuj and Brno copies.

Fig. 1a: Ptuj, page 8r, white and grey background

Fig. 1b: Brno, page 11r, light blue background

Fig. 2a: Ptuj, page 12v, long brown-black mantle, pink and grey background

Fig. 2b: Brno, page 15v, long brown-black mantle, pink background

X-rays. XRF is, due to its non-destructiveness, often used for analyses of cultural heritage objects; it is suitable for composition analysis of inks and pigments based on the detection of the present inorganic elements.

14 J. Vodopivec et al., 'Characterisation of Colouring Agents in Determining the Causes of Damage in the Ptuj Gratae Posteritati', in: *Konserviranje knjig in papirja 2 = Book and paper conservation 2* (Ljubljana: Archives of the Republic of Slovenia, 2016), 48-57, cit. 51-55.

15 T. Trojek, 'Reduction of surface effects and relief reconstruction in X-ray fluorescence microanalysis of metallic objects', in: *J. Anal. At. Spectrom.,* 26 (2011), 1253-1257.

Fig. 3a: Ptuj, page 18r, brown-black stocking, light blue background

Fig. 3b: Brno, page 19v, black stocking, intense green background

Fig. 4a: Ptuj, page 18v, light green background

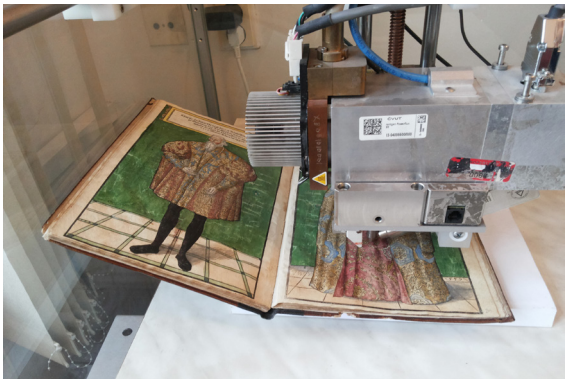

Fig. 4b: Brno, page 20r, intense green background

PIXE analysis of the dyes and pigments in the colouring materials used in the Ptuj copy

The ***white*** pigment, sampled from points 12, 20 (Fig. 2a), 21, and 25 (Fig. 3a), is characterized by a high lead content (>300 μg/cm^2), which implies the use of basic lead carbonate.[16] It was also used in combination with other pigments to obtain a lighter cast, such as pale violet (point 18, Fig. 2a) and in the tones used to portray skin colour (points 27, 30, and 36; Figs. 3a-4b).

A **strong red** colour was achieved with cinnabar[17] (sampled from points 2, 8, and 24), while minium[18] was used for milder red tones (point 16). In some cases, a small amount of minium was also mixed with the strong red of cinnabar (points 8 and 24). The dark red in point 31 (Fig. 4a) was achieved by a mixture of pigments: the presence of sulphur and arsenic suggests realgar[19] or auripigment,[20] while the other strong colourants[21] in point 32 (Fig. 4a) are cobalt and iron.[22]

Iron is the most abundant colourant in the **black-brown** tones. In points 2, 6, 9, 10 (Fig. 1a), 14, 19 (Fig. 2a), 29 (Fig. 3a), and 35 (Fig. 4a), it appears together with copper and potassium, and in point 22 with potassium only. This indicates the presence of iron gall ink as a colourant.[23]

The ***green*** colour (sampled from points 4, 7, 11, 17, 23), and 33 (Fig. 4a) is based on copper compounds. As the copper value dramatically exceeds those of other elements, the pigment was probably prepared from malachite[24] or verdigris.[25]

16 Basic lead carbonate: $2PbCO_3 \cdot Pb(OH)_2$

17 Cinnabar: HgS

18 Minium: Pb_3O_4

19 Realgar: α-As_4S_4

20 Auripigment: As_2S_3

21 Colourant: a dye, pigment, or other substance that colours something.

22 J. Vodopivec et al., note 14, 54.

23 J. H. Hofenk de Graff, *The Colourful Past: Origins, Chemistry and Identification of Natural Dyestuffs* (Riggisberg: Abegg-Stiftung, 2004), 286.

24 Malachite: $CuCO_3 \cdot Cu(OH)_2$

25 Verdigris is not a unique chemical substance but it is a collective name for various copper acetates. Their color varies from blue to green.

Four points in the ***blue*** fields were measured, and these were found to have three different compositions. The high copper density in point 13 may indicate a pigment-based on azurite.[26] Another blue in point 3 shows no characteristic elements and could have been made of an organic pigment. Two points, 26 (Fig. 3a) and 32 (Fig. 4a), show high densities of silicon, potassium, iron, cobalt, and arsenic; the respective area densities differ by a factor of 1.4, so they represent the same pigment. Nickel appears as a trace element. The pigment is probably a mixture of smalt (potassium and cobalt silicate) and some other copper-bearing minerals, such as erythrite,[27] or (as there is nickel present) skutterudite or asbolane,[28] as well as some other cobaltiferous compound. In either case, this blue pigment appears to be the most specific among the whole colour palette, as demonstrated by the linear relation between arsenic, cobalt, iron, and silicon. It may then be used as a parameter for discriminating between different phases of pigment colouring based on natural cobalt-arsenic minerals in use since the 16th century.[29] The use of synthetic cobalt compounds may be excluded. The production of cobalt arsenate as cobalt violet started only in 1859.[30] In points 26 and 32, a characteristic mineral mixture is present.

Of the three ***yellow*** points, two (points 5 and 34) show no characteristic elements, so they could be organic in matter, while a third (point 28, Fig. 3a) shows a clear signal of gold, which means that the pigment was made of a fine gold powder dispersed in a binder. However, the gold density is low.

The ***skin colour*** was measured in two points in the hands (point 27 and 30, Figs.: 3a, 4a) and in one point on the face (point 36). The predominant element is lead. The skin colour was obtained with a mixture of lead white and red minium, which was enhanced by a small amount of cinnabar in points 27 and 36.

Results of the XRF analysis of the dyes and pigments in the colouring materials used in the Brno copy

As the aim of this study is to compare the elemental composition of the colouring materials in the Ptuj and Brno copies, we focus mainly on the evaluation of similar corresponding points measured in both copies.

XRF analysis of the ***white*** colour (points no. 12, 20, 21, and 25, fig. 3a) identified a pigment containing a high amount of lead (between 200 – 1200 μg/cm^2), which signifies the possible presence of lead white. Similarly to the Ptuj copy, in some of the measured points lead white was also applied together with other pigments in order to create a pale shade, either in a mixture or as overlapping (such as the light blue colour in point 13 or light orange in point 27).

Cinnabar was predominantly used in the ***red*** colour (points no. 2 and 24). A more complex structure of the colour layers was found in point 8 (red sleeve with yellow decoration), where a high content of lead, mercury, and gold was found. In this point, cinnabar was probably mixed with some lead pigment (e.g., minium) and this layer was covered with a thin gold surface layer.

XRF analysis of the ***black-brown*** colour showed a varied composition of the pigment used. In point 1, the measured spectrum corresponded to the spectrum of the blank paper, which implies the use of some organic pigment (and thus not identifiable by XRF). In point 10 (brown shoe, Figs. 1a,

26 Azurite: $2CuCO_3 \cdot Cu(OH)_2$

27 Erythrite or red cobalt is a secondary hydrated cobalt arsenate mineral with the formula $(Co_3(AsO_4)_2 \cdot 8H_2O)$. Erythrite and annabergite $(Ni_3(AsO_4)_2 \cdot 8H_2O)$ (nickel arsenate) form a complete series with the general formula $(Co,Ni)_3(AsO_4)_2 \cdot 8H_2O$.

28 Asbolane is a type of a hexagonal mineral containing calcium, cobalt, hydrogen, manganese, nickel, and oxygen. Its chemical formula is usually given as $(Ni,Co)_{2-x}Mn^{4+}(O,OH)_4 \cdot nH_2O$

29 J. Perez-Arantegui et al., 'Characterization of cobalt pigments found in traditional Valencian ceramics by means of laser ablation-inductively coupled plasma mass spectrometry and portable X-ray fluorescence spectrometry', in: *Talanta*, 74, 2008: 1276.

30 R. Hudoklin, *Tehnologija materialov, ki se uporabljajo v slikarstvu. 2. del: slikarska barvila, veziva in redčila* (Ljubljana: Akademija za likovno umetnost UL, 1958), 71.

1b), a high amount of gold was found (120 μg/cm^2) together with mercury, lead, copper, and potassium, so this point was probably coloured with a mixture of pigments covered with a thin gold layer. Arsenic and sulphur were detected in point 19 (long black mantle, Fig. 2b), which may be explained by the use of realgar[31] or orpiment (auripigment)[32]. No iron and copper were detected, which implies the use of carbon black[33] as the colouring material.

Analysis of the ***green*** areas [points no. 7, 11, 33 (figs. 4a and 4b), and 37] revealed a prevailing presence of copper, which suggests the utilization of green pigments (malachite or verdigris. Various shades of green colour in these points were probably achieved by an uneven use of the lead white pigment, because a diverse signal of lead was also detected in the green points. In point 26 (green, Fig. 3b), a high amount of copper (773 μg/cm^2) was detected.

Furthermore, the ***blue*** areas in the Brno copy turned out to have a diverse pigment composition. Results of the XRF analysis in point 3 are similar to the Ptuj copy: no typical element (apart from a small signal of copper) was detected, which may signify the use of an organic pigment. Point 13 showed a high amount of lead and only a very small signal of copper; this may indicate the use of an organic blue pigment applied together with the lead white to obtain a pale blue shade. Elemental composition in point 32 is in agreement with the Ptuj copy; high amounts of silicon, potassium, iron, cobalt, and arsenic were found, and a small amount of nickel (6 μg/cm^2) was also detected in this point. Thus, similar pigments as in the Ptuj copy were probably used in this part (as described in the PIXE Results section).

XRF analysis of the ***yellow*** colour was performed in point 28 (Fig. 3a), where a presence of lead and copper was detected as well as a small amount of gold (similarly to the Ptuj copy). The last compared colour was ***skin colour*** (light orange) measured in points 27 and 30. In both points, high contents of lead were determined suggesting that lead white together with minium were used in these points. The considerable signal of mercury in point 27 also revealed the probable presence of cinnabar. (Figs. 3a, 3b, 4a, 4b).

From the analysis of the elemental composition of colouring materials in woodcuts of the two copies of Herberstein's book, the main pigments were determined. The results of PIXE and XRF analyses of the colouring materials are in many cases similar. The ***white*** colour in both books was identified as a pigment containing a high amount of lead, which signifies the presence of lead white.

Cinnabar was predominantly used in the ***red*** colour, but at some point, cinnabar was mixed with some lead pigment (e.g., minium).

The presence of lead (Pb) and copper (Cu) was detected in the ***yellow*** colour as well as a small amount of gold (Au). In the ***skin colour*** (light orange), a mixture of lead white with minium or cinnabar was used.

Analysis of the ***green*** areas confirms the presence of copper, which indicates the utilization of malachite or verdigris. In the ***blue*** points of both the Ptuj and Brno copies, high amounts of silicon, potassium, iron, cobalt, and arsenic and a small amount of nickel were found.

The main difference is in the ***black*** parts. In the Ptuj copy, iron is the most abundant colourant in the black-brown tones. In the Brno copy, nearly no iron and copper were detected by XRF on black mantel (Fig. 2b) and black stocking (Fig. 3b), which indicate that probably black carbon was used as a colouring material.

Conclusion

Although the majority of analysed pigments were practically similar in both books, the physical condition of the two books is

31 Realgar: α-As_4S_4, is an arsenic sulfide mineral.

32 Orpiment: a deep-colored, orange-yellow arsenic sulfide mineral with formula As_2S_3.

33 Black carbon: pure carbon (soot, lamp black), produced by burning organic material.

different. The main apparent difference in the used colourants of the Ptuj and Brno copies was found in the black hue used for colouring the black mantel and black stocking and the intense green background.

The Ptuj copy shows damage resulting from frequent use and long exposure to humidity. In addition to this damage, the hand-coloured illustrations have also suffered due to corrosive action of the iron and copper found in black, green, and blue pigments used. This chemical damage was accelerated by the poor environmental storage conditions, in which the Ptuj book was previously kept.

The book stored in the archives in Brno is well-preserved. The copy shows no significant damage, although the pigments used were similar, except those used for black hue, for which we presume that carbon black was used. For more precise information on the pigments and colours used, an investigation with Raman spectroscopy and FTIR for organic compounds is needed. It would also be interesting to compare the results from the Ptuj and Brno copies with those obtained from the copies kept in London at the V&A Museum and the British Library.

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On this occasion, we would like to thank Ladislav Macek and Tomáš Černušák, from the Moravian Provincial Archives in Brno and Mira Petrovič and director Matjaž Neudauer, from the Ivan Potrč Library in Ptuj, for their willingness to support our common research.

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THE LEIDEN CHARTER PROJECT: DEVELOPING A SYSTEMATIC APPROACH FOR THE CONSERVATION OF THOUSANDS OF CHARTERS

Résumé

Le souhait de numériser, de conserver et de reloger 10 000 chartes de parchemin a demandé une approche systématique. L'ancien stockage d'enveloppes placé verticalement n'était pas souhaitable et devait être remplacé. Une nouvelle méthode de stockage sans acide a été choisie. Peu de temps après le début des travaux sur les premières archives, une approche systématique possible est devenue claire. Une méthode de documentation efficace avec des bandes de papier de couleur attachées aux anciennes enveloppes, indiquant chacune un processus différent, a été développée. Quatre cartes d'instruction A4 plastifiées ont été conçues pour l'instruction d'internes ou de techniciens en conservation. La restauration des sceaux de parchemin et de cire et l'aplatissement général des chartes ne devaient être effectués que par un restaurateur formé et expérimenté.

Keywords: Conservation, Parchment, Flattening, Storage, Instruction Cards

Introduction

The wish to digitize, conserve and rehouse 10,000 parchment charters required a systematic approach. Essential criteria for digitization were a clear view of the text and the wax seals. These criteria were met by cleaning and flattening the parchment and cleaning and repairing the wax seals if needed. The old, vertical envelop storage system was undesirable and had to be replaced. Because this project would take many years a systematic and consistent work method needed to be developed.

Many lessons were learned from a pilot project covering the restoration and storage of approximately 60 charters from the oldest part of the Leiden City Archive. A new acid-free method of storage was chosen, and a different archive, with documents, related to the monasteries, was selected, because of the many exceptions and restorations needed in the pilot archive. Soon after starting the work on this archive, a possible systematic approach became clear. Within this archive the documents were more or less the same in size and, their physical condition was relatively good.

An efficient documentation method with coloured paper strips attached to the old envelops, each indicating a different process, was developed. Describing the different processes was necessary for future reference. Four laminated A4 instruction

cards were designed for the instruction of interns and conservation technicians. The restoration of parchment and wax seals and the overall flattening of the charters were only to be performed by a trained and experienced conservator-restorer.

The project workflow

The project starts with the documentation of the charter (appearance and material) and the treatment necessary. The latter is visibly indicated with coloured strips, which are attached to the envelope with a clothes peg. Each coloured strip indicates a different kind of treatment, for example, dry cleaning of the charter and the wax seal (white), flattening of the seal tags (light green), overall flattening of the charter (dark green), parchment restoration (orange), restoration of the wax seal (yellow). With these coloured strips, it is immediately visible which treatments are needed and which charters should be treated by which person within the workflow, either the conservation technician or the conservator-restorer.

Generally, flattening of the twisted seal tags and cleaning of the charter and the wax seals are the most common treatment procedures. These procedures are executed by the conservation technician or a 2nd-year Cultural Heritage (Reinwardt Academy – Amsterdam) intern. The procedures are explained to the intern by the conservator-restorer with the help of instruction cards specially developed for this project.

Flattening of the seal tags

Moistening of the parchment seal tags is done with the help of a mini-moisture chamber[1] which consists of a piece of Hollytex®, a piece of moist synthetic needle felt and a plastic zip bag. The moistened parchment seal tags are put between strips of absorbent paper and acid free cardboard strips,

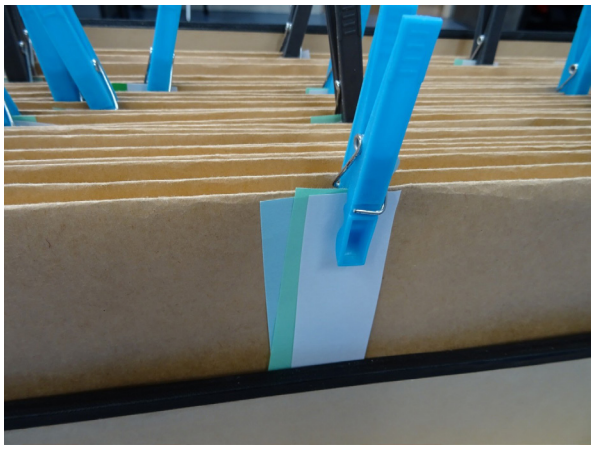

Fig. 1: Coloured strips indicating which treatment a charter needs

held together by bulldog-clips. They are left to dry on wooden boards which are placed in a catering tray collecting trolley for a minimum of 48 hours.

Cleaning of the charter and the wax seals

After sufficient drying of the flattened seal tags, the charters are cleaned with a smoke-sponge.[2] The wax seals are cleaned with a dry brush and eventually with a slightly wet brush and dabbed with paper tissue. They are then placed in their new acid-free storage according to the order of inventory numbers (determined during the documentation stage by the conservator restorer).

Storage and digitization

Preparations for the mounting of the charters with Melinex® strips within their storage are made. The charters are transported to the photography department in their new storage, partially fastened with the Melinex® strips for safer transportation. The photographer digitizes the front of the charter and the back if there is any text on that side. The seals are also photographed separately, mostly front only.

Restoration

The restoration of parchment and wax seals and the overall flattening of the charters

1 The mini-moisture chamber is developed by Edith Greuter, book and paper conservator at Erfgoed Leiden – The Netherlands.

2 Also called "wallmaster" it is a natural rubber sponge and was originally designed to remove soot after fires. It takes up dust and dirt without crumbling. order number 22301 at www.gmw-shop.de (Gabi Kleindorfer).

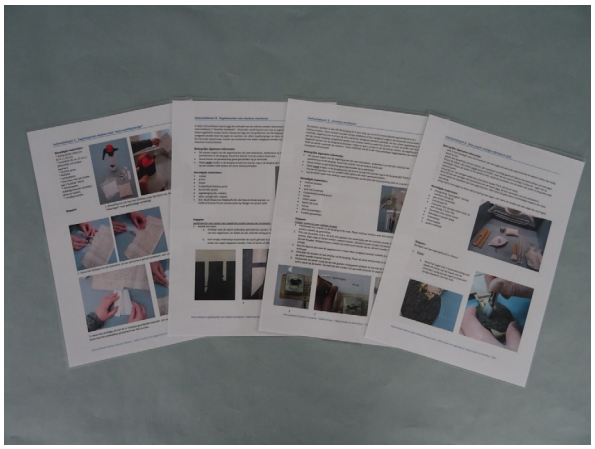

Fig. 2: The four laminated instruction cards

are only executed by a trained and experienced conservator-restorer. These kinds of treatment procedures are exceptions, and the charters it concerned are temporarily taken out of the systematic workflow and are treated separately by the conservator restorer. After treatment, they are placed in their new storage and subsequently returned to the systematic workflow of the overall project.

Instruction Cards

The project consists of many different conservation procedures. Describing these was necessary for future reference, not only for documentation purposes but also to secure a certain degree of consistency in approach and execution quality, without depending on specific individuals. This has been found to be very important.

The instruction cards were only made for procedures which could be executed by a conservation technician, a conservation intern or perhaps a talented volunteer. Together with a verbal explanation by the conservator-restorer, the instruction cards are used to explain the different procedures and workflow. Later the instruction cards can be used as a reminder during the work process.

Four instruction cards were made for the following conservation procedures:

Fig. 3: Charters mounted with Melinex® strips in their final new acid-free storage

1. Moistening and flattening of parchment seal tags,
2. Cleaning of wax seals,
3. Mounting the charters in the tray,
4. Mounting the seal tags and seals in the tray.

Storage

The chosen acid-free storage consists of stackable corrugated cardboard trays[3] intended for the mounting and storage of charters (with wax seals) and other three-dimensional objects. A maximum of three trays can be placed in standard corrugated cardboard drop-spine boxes (clamshell).

From the three available tray sizes, we generally use the middle and occasionally the largest. Generally, two charters fit in one tray. The order of inventory numbers is important and is maintained as far as possible in the placing of the charters in the trays and boxes.

3 The 3D-tray is developed by Hoogduin Paper Restorers in Delft - The Netherlands.

The charters are mounted on the trays by means of, generally, two Melinex® strips. These strips are threaded through cuts made in the cardboard, using a pattern which locks the strips in place, so no pressure-sensitive tape is needed. The seal tags are secured under a strip or flap created by separating the thin top layer of the board from its corrugated centre. Fragile seals are protected by placing them in a synthetic needle felt cover, other seals are placed on a synthetic needle felt disc.

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RESTORATION OF GOUACHE PAINTINGS ON PAPER

Riassunto

Oggetto dell'articolo che segue è il sondaggio complessivo ed il restauro conservativo del complesso di sei pitture a guazzo su carta barocche. I dipinti, che sono aggiustati in cornici di legno e che secondo i risultati del sondaggio di scienze naturali potrebbero essere stati fatti prima del 1720, fanno parte delle importanti collezioni del castello barocco di Jaroměřice nad Rokytnou. Le opere sono state sottoposte ad un complesso processo di restauro comprendente la pulitura meccanica e capillare della loro superficie, il raddrizzamento del supporto cartaceo, l'integrazione della materia cartacea mancante ed il ritocco della superficie colorata. Sono state sottoposte ad interventi anche le cornici ornamentali con listelli dorati.

Keywords: Conservation-restoration, paper, gouache, cleaning, retouching

The presented work describes the restoration process of six gouache paintings on handmade paper assembled in decorative frames originating in the same period, with wooden backing and glass. The artworks are the property of the National Heritage Institute in České Budějovice. They originally belonged to the collections of the chateau of Uherčice.

The dimensions of the framed artworks are 48 × 38 cm with one exception of 60 × 41 cm. The artworks were unsigned and undated, and their provenience is unknown. Based on preliminary examination revealing original watermarks in the paper, the collection might have been painted in the 18th century.

The watermark probably comes from the paper factory in Nedošín near Litomyšl. The watermark was used after 1785 and consisted of a crowned cartouche with a post tube and the letters *IP*. In the second half of the folio, there was the inscription *C* and *I HONIG* with a crown-tipped image. This part from the second half of the folio is the same as the watermark on the paper support of the artwork.

All the paintings depict floral still-lives with vases. Various motifs, such as putti, lions, artichokes, or the bust of a young man with rocailles can be found at the bottom of the still-lifes. The paintings are executed in opaque and semi-transparent layers that cover fine underdrawings. The paper support was not entirely covered with paint layers.

The decorative frames were made from oak profiled wood. There are decorative gilded relief ledges with hallmarks on the inner side of the frames. In some cases, the

Fig. 1: The gouache painting before conservation-restoration

Fig. 2: The gouache painting before conservation-restoration in raking light

ledges were missing. The wooden supports were made out of unspecified softwood. As the painting was exposed to direct day light, outlines of the motives on the wooden backing appeared.

The examination was conducted to consider the condition and defects of the artworks and to identify the material composition. The surface of the paintings was covered with dust and dirt including insect excrements. The paper supports were deformed due to moisture, and there were visible tidelines in many areas, disturbing the aesthetic value of the artworks. There was also foxing in parts without the paint layer. The paint layer was fragile and flaking off the supports. These defects were examined in visible daylight, raking and translucent light. The paper support was examined in translucent light, which revealed the presence of Vergé and watermarks. The UV luminescence photography allowed the proper location of the tidelines and foxing defects. The painting media used were sensitive to water and water-ethanol solution. It was necessary to pre-consolidate the paint layers before wet cleaning. The measurement of pH brought the average value to 5.3. The average pH value increased to 6 in the course of the restoration.

The XRF examination proved the presence of lead white, minium, cinnabar and pigments based on copper in the paint layer. The invasive examination using scanning electron microscopy (SEM) was carried out for more accurate determination of the paint layer composition, particularly of the blue pigments. The blues contained particles of azurite, calcium carbonate and dolomite. There was no evidence of Prussian blue, so we assume the creation of the paintings occurred before the 1720s, the time of a worldwide expansion of this blue pigment. Nevertheless, the watermarks shift the date of creation to the late 18th century. The presence of the natural gum in the binder was proved by micro-chemical reactions. The paper support of the gouache paintings consists of linen and hemp fibres. The examination of microbiological attack showed negative results.

Fig. 3: The gouache painting after conservation-restoration

Pre-consolidation of the fragile paint layers was executed using 0.25% water solution of sturgeon glue in aerosol form. The artworks were dry cleaned with soft brushes and Cleanmaster gums.[1] Then, wet cleaning was performed. The paintings were slowly and carefully moistened, firstly in the climatic box and after that on the water surface. Moistening of the parts with the presence of white pigments was quite tricky and took more time than with other parts. Wet cleaning on capillary non-woven fabric[2] was provided after the paper support was completely and evenly moistened. This process reduced dark and visually disturbing leaks. The final step of the wet cleaning and flattening of the treated objects took place on a low-pressure table. The recto sides of the artworks were cleaned with demineralized water, water-ethanol solution 1:1 and 0.25% solution of Tylose MH 300 using an airbrush, vacuum pressure of ca 160 hPa and at temperature of 60 °C. The whole process was repeated until the impurities washed away from the paper support into the wet filter paper laid under the artwork. In the end, a 0.25% solution of Tylose MH 300 was applied to resize the paper and fix the paint layer.

Finally, the artworks were mounted on the paper board, 2 mm thick, with alkaline reserve using the strip-lining method. Strips of Kawashahi Japanese paper (35 g/m^2) were adhered to the edges of the verso of the paintings and to the paper board with Klucel G.[3] Retouching was performed using pastels and pigments bound in the solution of Paraloid B 72 in ethanol.

The wooden decorative frames and wooden supports underwent an overall conservation-restoration treatment as well. They were cleaned from the impurities and unsuitable coatings and glues.

A solution of fungicidal and insecticidal preparation Bochemit QB[4] in demineralized water (1:9) was applied to the wooden frame and the wooden supports to prevent infestation by fungi and wood-destroying insects. The gesso base of the gilded frame was reinforced after the penetration solution (demineralized water and ethanol 1:1) with a solution of 7% animal glue in water. The back of the wooden supports was coated on both sides with a 10% solution of Paraloid B 72 in toluene. Minor deeper defects of the wooden frame were filled with a mixture of beech sawdust bound with wood dispersion adhesive. Subsequently, the fillers were treated with wax-resin filler, tinted with pigments.

1 100% clean soft latex gums without chemicals, solvents and other additives.

2 Paraprint OL60 non-woven material, made of 100% viscose, reinforced with an acrylate binding agent. https://gmw-shop.de/en/tools-and-material/diverse-materialsnon-wovenspolyester-filmmesh/102/paraprint-ol-60-capillary-non-woven-fabric

3 See methodology for preparation of adhesive foils of Japanese paper and cellulose ethers, Czech National Library 2013. https://text.nkp.cz/o-knihovne/odborne-cinnosti/sprava-a-ochrana-fondu/odborne-texty-a-informace/metodika-vyroby-adhezivnich-folii-z-japonskeho-papiru-na-bazi-etheru-celulozy

4 Bochemit QB fungicidal and insecticidal agent contents alkylbenzyldimethylammonium chloride and boric acid. https://www.bochemitshop.cz/index.php?controller=attachment&id_attachment=338&inline=1

The gilded ledges were filled with Bolognese chalk, glued in 7% with glue in water, in the place of a scraped or fallen clinker base. This was followed by gilding on red ground. Finally, the protective coating of microcrystalline wax – a 5% solution of Cosmoloid H 80 in petroleum solvent was applied to the oak timber battens and polished with a soft cloth after solvent evaporation.

The restored paintings were finally assembled back into the original set consisting of the treated frames, the wooden supports and the glass covers with spacers of non-woven textile between the glass and the paper.

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Edith Greuter

THE VALUE OF CONSERVATION AND DIGITIZATION OF ARCHITECTURAL AND DESIGN DRAWINGS FOR HISTORICAL RESEARCH

Résumé

Les collections de dessins grand format sont toujours un défi à manipuler et à stocker. La conservation et la restauration sont souvent nécessaires avant que le relogement ou la numérisation ne soit également possible.L'ingéniosité de la restauratrice-conservatrice de Heritage Leiden a été mise à l'épreuve quand on lui a demandé de préparer un nombre fixe de dessins d'architecture et de design dans un délai très limité. Dans cet article, le flux de travail conçu, les méthodes de conservation telles que l'aplatissement, les matériaux de conservation et les solutions de stockage sont expliqués. Rendre l'objet physique disponible pour la manipulation et la numérisation offre aux chercheurs des sources historiques précieuses. Connaissant les avantages de la conservation et de la numérisation pour la recherche historique, y consacrez temps, argent et efforts.

Keywords: Architectural drawings, flattening, conservation, digitization, storage

Introduction

Large-format drawings are always a challenge to handle and store. Conservation and restoration are often needed before rehousing or digitization are even possible. In this article, I would like to share my experience as a conservator with the conservation of two large-format drawing collections and the effect their treatment had on the use of these drawings, in physical or digital form.

This whole project started with some unintended preliminary research. I had visited a fellow paper conservator at the City Archives of Amsterdam in September 2017, because I wanted to know more about the method he used for flattening rolled-up architectural drawings. This method was based on the publication "Paper Line Light"[1] by Eva Glück and other authors, published by the Akademie der Künste, Berlin 2012. He had made some alterations, which inspired me to take a good look at the possibilities in my studio at Heritage Leiden, and I started a small pilot project there in October 2017.

In early December 2017, management was confronted with left-over budget funds,

1 *Papier Linie Licht Konservierung von Architekturzeichnungen und Lichtpausen aus dem Hans-Scharoun-Archiv/ Paper Line Light The Preservation of Architectural drawings and Photoreproductions from the Hans Scharoun Archive,* E. Glück and others (Berlin: Akademie der Künste, 2012).

Fig. 1.1, 1.2 The Van der Heijden drawings in their previous condition and storage

Fig. 1.3 The Jilleba design drawings in their previous condition and storage

and they decided that two drawing collections were going to be digitized and therefore needed conservation treatment.

That was positive news with the negative note that the conservation had to be finished by the end of the year, which meant within one month. This was, of course, not feasible, but I started anyway. With the provided budget, materials could be bought, and two experienced conservators could be hired. Fortunately, paper conservators Annet Doves and Alexandra Nederlof were able to start on short notice.

The collections

The two chosen drawing collections were a recently acquired collection of stained-glass window design drawings from a renowned firm in Leiden called Jilleba, which celebrated their 80th anniversary in 2018 and the drawings of architectural agency Van der Heijden from Leiden, dating from the end of the 19th century until approximately the 1950s. The Jilleba collection consisted of around 680 rolled-up drawings in a variety of sizes and types of paper. The Van der Heijden collection consisted of almost 5,200 flat and 1,800 rolled up drawings. The flat drawings were original drawings on transparent or opaque paper or photo-reproductions, such as blueprints. The rolled-up drawings consisted of all kinds of paper, either original drawings or photo-reproduction techniques. Many of these papers had been used on both sides. The condition and storage of both collections were not good. All the roled-up drawings in both collections where physically not accesible.

Conservation

The conservation of the two collections basically consisted of dry cleaning, mending of tears, flattening and new acid-free housing.

Fig. 2: Schematic representation of the single moisture layer sandwich

Dry cleaning

Dry cleaning was first done with a smoke-sponge, but soon we started using a brush and even a vacuum cleaner because the drawings were sometimes so severely soiled that the smoke-sponges were rapidly saturated with dust and dirt. Personal protection, including gloves, facial masks, and some air suction, was used during dry cleaning.

Mending tears

Depending on the amount of damage in combination with the type of paper, two methods of tear repair were used.

For the thicker papers, we used Japanese paper adhered with freshly cooked wheat starch paste, while for the thinner and transparent papers we used Archibond®, which is a 100% Manilla tissue, approximate weight 9,5 grams, coated with a heat-set paraloid acrylic adhesive. Even complete linings could be done with this repair paper. This, in the case of transparent papers, often had the best and less obtrusive result, compared to mending individual tears. Due to the tight schedule, the size of the drawings and logistics in the studio, the use of Archibond® turned out to be the most practical method.

Flattening

Flattening was needed in two cases, first for flat drawings with creases or severe folds and second for the rolled-up drawings. In the first case, we used ironing devices like the one used for applying the heat-set repair tissue. In the second case, we used the flattening method developed during the aforementioned pilot project.

The general idea of this flattening method is moistening the paper to relax the cellulose fibres in a safe, minimal, and controlled manner, like in a humidity chamber. After moistening, the drawings are placed in a drying stack, which is a combination of blotter paper, cardboard, and weight on top: they are taken out of this drying stack after approximately a week of drying time. We were able to create a good workflow, which made it possible to flatten about 60 to 80 drawings per day, depending on the thickness of the paper. The studio only had space for two drying stacks, which meant two days of flattening during one workweek.

Moisture sandwich

This method is generally a sandwich of materials in which the drawing is rolled out for a short period. The sandwich can consist of one moisture layer or two moisture layers. Which one you need to use depends on the thickness and the type of paper to be flattened.

Single moisture layer

A single moisture layer sandwich consists of the following layers:
First, a layer of wet blotter paper is used; the second layer is a water-vapour-permeable material, such as Gore-tex® or Sympatex®. These materials are rather expensive, so we used a much more economical material called SMS Hydrofobe[2], which works in a similar manner. The drawing is now safely rolled out on top of this second layer with the aid of a cardboard tube together with the top layers of the

2 SMS Hydrofobe: a three layer 100% polypropylene non-woven fabric (Spunbound Meltblown Spunbound), 75 g/m^2.

Fig. 4: Schematic representation of the double moisture layer sandwich

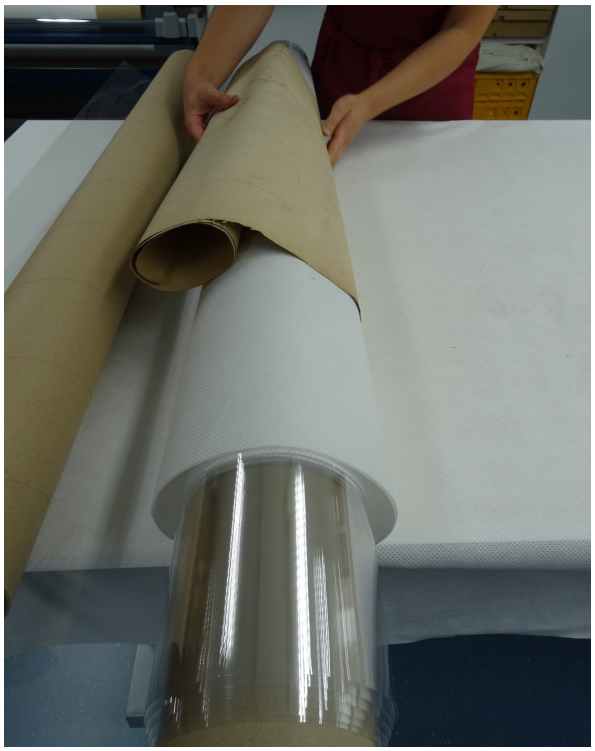

Fig. 3: Unrolling of the drawing in the moisture sandwich

Fig. 5: Jilleba drawings rolled onto a cardboard tube together with a sheet of acid-free paper

sandwich. The top two layers consist of thick Hollytex® or Reemay® and Melinex®.

Double moisture layer

If it is a double moisture layer sandwich, the top layers consist of:

SMS Hydrofobe followed by moist to wet Paraprint OL 60[3] or blotter paper and thick Hollytex® or Reemay® closed with a layer of Melinex®. In both sandwiches, the top Melinex® layer keeps the moisture within the sandwich and prevents the cardboard tube from becoming wet during treatment.

Depending on the thickness of the paper of the drawing, the time in the moisture sandwich can vary from 30 seconds to 20 minutes. The double moisture sandwich speeds up the process considerably. The length of the sandwich depends on the available tables and materials. A long sandwich could contain several drawings at the same time and, therefore, efficiency increases.

Housing

All the drawings needed to be (re)housed after conservation treatment. Even though the two collections were treated at the same time, decisions regarding the type of housing were based on different criteria per collection.

The Jilleba drawings were flattened and housed in acid-free cardboard folders if a

3 Paraprint OL 60: capillary non-woven fabric, 100% viscose, reinforced with an acrylate binding agent, 60 g/m².

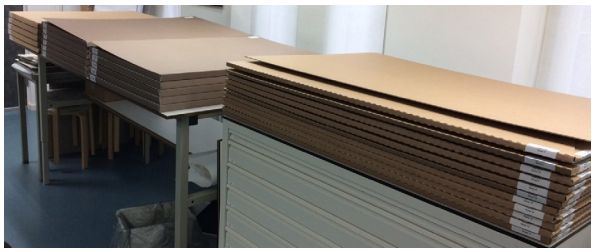

Fig. 6: The drawings in the new acid-free cardboard folders in different sizes

drawing did not exceed the size of the largest available folder. If a drawing were larger, it would be rolled on a cardboard tube together with a sheet of acid-free paper. This paper was longer and wider than the largest drawing to protect the drawings completely. This roll was placed in an acid-free box. Along the edge of the acid-free paper, labels with the individual inventory numbers were adhered. Next to these labels, the length of the paper sheet was noted in pencil, so it was clear before unrolling what size table would be needed. Depending on the thickness of the paper a maximum of ten drawings was rolled onto a tube. The drawings of several inventory numbers could be rolled together on one tube; they were physically separated by long strips of paper with inventory labels for identification.

All the flat drawings within the Van der Heijden collection had to be rehoused in acid-free cardboard folders. The maximum size of this new folder was dictated by the size of the shelves on which the former grey-board folders had been stored.

All the rolled-up drawings within the Van der Heijden collection were flattened and stored in different- sized cardboard folders.

If a flattened drawing was larger than the largest folder available, the drawing was folded and stored flat instead of rolled on cardboard tubes like in the case of the Jilleba drawings. Among several reasons, we chose this option primarily because the inventory numbers in this part of the collection consisted of many drawings, sometimes even up to 60.

Taking out one or two drawings and rolling them separately would produce too many exceptions in storage and secondly

Fig. 7: All the drawings of one inventory number

would become too difficult to administer for digitization and final storage. Most of these long drawings consisted of several smaller design drawings on just one very large sheet of paper: folding was easily done between two designs. The Jilleba design drawings also have a more artistic value compared to the more technical value of the van der Heijden drawings and, therefore, folding them was not an option.

There were three exceptions in the Van der Heijden collection: three drawings of complete building facades, filling the entire paper, were rolled together on one cardboard tube.

The old paper wrappers, with content information written on them, were re-used to keep the drawings of an inventory number bundled in their new paper folder. More than one inventory number could be placed in this folder, so the re-used wrappers also functioned as a separation between two

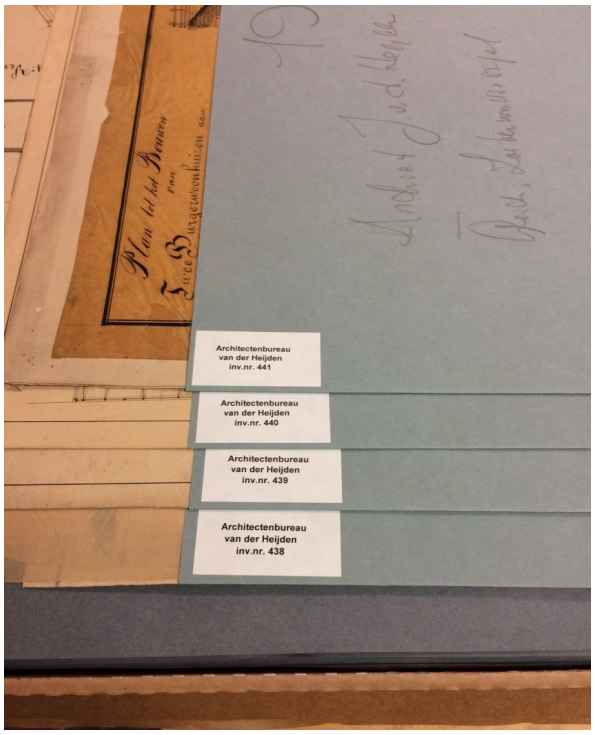

Fig. 8: Re-use of the old paper wrappers with the new inventory label

inventory numbers. Several paper folders were placed in the cardboard folder; individual inventory labels along the edge identified the content of each paper folder. In both the Jilleba and the Van der Heijden collection, the largest drawing within an inventory number determined the size of the paper and cardboard folder needed.

Digitization

At Heritage Leiden, we have a photographer, but such a large-scale project in both the size and amount of drawings is simply not feasible for one person and the studio. The drawings, therefore, were processed at a digitization company. Due to the time pressure, it was not possible to have an extensive tender procedure. Ultimately, only one digitization company was able to send us a quote based on the inventory lists we had provided. Eventually 9668 digital images were made instead of the estimated 6600.

We did not have time to discuss all our wishes and the particularities of the collections. While rolling the Jilleba drawings on the new cardboard tubes, we decided to give some instructions for the unrolling and rolling of the drawings before sending them to the digitization company. Explanation in writing would take too much time and is quite difficult when the level of knowledge and experience of the digitization operator is not known. We decided to film the rolling and unrolling while explaining the action. This made everything very clear, and the digitization company was grateful.

We could not check all the folders, boxes, or drawings after we got them back from the digitization company. A few random checks did show that what we thought was obvious and needed no specific explanation was not quite the case. For example, all the paper wrappers were put back incorrectly. This meant that the inventory numbers could not be seen when opening the paper folder. We had to correct all of them. This also happened with the labelled paper strips between two inventory numbers in the rolled part of the Jilleba collection, which meant we had to unroll them all to correct that. That was quite time consuming.

After sending the last batch, we visited the digitization company to see how they were working on our drawings. After this visit, we were absolutely certain that the conservation treatment we did was quite a necessary measure.

Historical research at Heritage Leiden

All the collections of Heritage Leiden are available for research by any individual who is interested from either a private or professional point of view. This research can be done by using physical objects in our reading room or by visiting our website www.erfgoedleiden.nl.

Large-format objects are challenging to examine in a reading room setting, and therefore, digitization makes studying them much more accessible. Before digitization,

the drawings from both collections were already of interest to colleagues at Heritage Leiden.

Leiden has a historical inner city dating from the 1200s. In the 14th century, the inner city developed into the shape it has now, followed by a second period of growth in the 17th century.

Many of the buildings in the inner city have, of course, changed in appearance over time. The city council started a subsidy program in 2009 to offer owners of historic shop buildings a subsidy to reconstruct their shop facade to make the inner city a more attractive place to visit. A restoration architect working at Heritage Leiden advises on the possibilities of reconstruction. This advice is based on historical research done with the aid of technical architectural drawings, photographs and archival sources in the collections of Heritage Leiden. Some drawings found in the Van der Heijden collection are an excellent basis for this kind of reconstruction advice.

Researching the history of a building is not only done to advise on building permits or the shop facade program. Heritage Leiden also has two very passionate building archaeologists who document the history of the buildings in Leiden. Their research aims to capture the history and protect the physical remains of the historic inner city.[4] This is not only done using written and photographic documentation, but also by collecting fragments, like beams, bricks, roof tiles, wall-paper fragments, wooden panels, and other elements during building demolitions.

Information concerning their research is shared with the public through our website in a weekly column called "Discovery of the week", in which they reconstruct the history of an area, a building or a specific building element. Drawings like those in the Van der Heijden collection tell much about the technical elements and details of a building,

Fig. 9: Digital image of inventory number 385 Jilleba collection: a stained-glass window design by Pieter Geraedts Sr.

which is very interesting for restoration architects and building archaeologists.

André van Noort, a historian and archivist at Heritage Leiden, wrote a book[5] about the life and work of the artist Pieter Geraedts Senior. He was a painter of religious images and portraits, and he was a sculptor. He designed quite a lot of stained glass windows, mostly for churches.

Many of these designs were eventually made by the Jilleba firm. The book is filled with beautiful photographs of the work of Pieter Geraedts, but only five photos of design drawings can be found in the book. Those drawings were the only ones available in a good and flattened condition at the time of his research.

The book was published in 2015, and my colleague's interest and research is most likely the reason Heritage Leiden came across these beautiful design drawings: he

4 *Building archaeology in Leiden (NL): a practical approach*, De Vos, P.J. *in: Professionalism in the Built Heritage Sector*, K. van Balen & A. Vandensande (London, 2019), 27-36.

5 *Pieter Geraedts Sr. De kunstenaar die zichzelf bleef,* A. Van Noort (Warmond, Historisch Genootschap Warmelda: 2015).

was able to convince the Jilleba family to give the collection to Heritage Leiden so it would become available for the public.

This example shows that if the collection had been treated and digitized before the publication of the book, my colleague's research on the stained-glass window designs by Pieter Geraedts could have probably been more elaborate and better illustrated.

Conclusion

The first part of the project in December 2017 and January 2018 was quite chaotic; decisions were made on the go, short evaluations and changes were made quickly. The second part of the project in the second half of 2018 was well planned and designed beforehand; workstations for the different treatments were established. It was based on experience rather than on theory. We were able to experiment with the moisture sandwich, single or double layers of moisture and the effect it had on the different types of paper.

Of course, the demand to finish before the end of 2017 was not feasible. Perhaps the ignorance at that time turned out to be an advantage. If we had known the facts and figures in advance, we would probably not have started the project at all. Sometimes you just have to dive in and do the best you can, and we believe it turned out to be a successful project with an excellent result for both collections. We managed to treat and rehouse approximately 7,700 drawings in about 1,200 hours over 14 months, which means an average processing time of approximately 9.5 minutes per drawing.

What I also learned is that knowing the value your work has for other people, like colleagues and researchers, is very rewarding! Although conservation and digitization are time-consuming with related costs, they are also inevitable, not only for the safekeeping of heritage but also for the continuing use of the information embedded in these collections for research.

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PROBLEMS OF THE CONSERVATION OF ARTWORKS ON LARGE-FORMAT PAPER SUPPORTS

Riassunto

La problematica delle opere artistiche su carta di grande formato è trattata nell'articolo sia in generale, sia in modo illustrativo in due opere autentiche. La prima è il restauro del gruppo di disegni di grande formato su carta da pacchi di Milada Schmidtova, della seconda metà del XX secolo, la seconda poi il restauro della grande mappa di Náměšt nad Oslavou su carta e tela del 1756. Sebbene entrambi i lavori artistici distino l'uno dall'altro oltre 200 anni ed abbiano specifiche distinte, il principio di trattamento è analogo: il restauro complessivo comprende la stabilizzazione e il raddrizzamento del supporto cartaceo, l'eliminazione del supporto ausiliario non funzionale, la pulitura dello strato di colore, l'integrazione delle parti perdute di supporto ed i ritocchi finali. La parte finale dell'intervento di restauro – l'assestamento dell'opera artistica su un nuovo supporto ausiliare – è stata veramente una sfida. Non solo per il formato – 151 x 174 cm e 220 x 284 cm, ma anche per il suo futuro utilizzo.

Keywords: conservation, paper, support, backing, format

Introduction

The conservation of a work of art may be a challenge for many reasons. It may challenge the conservator's skills with its poor state of preservation, or the conservator's knowledge of the unique technology and materials used, or the conservator's courage in view of its incredible value. However, we must admit that there is a type of work of art that always presents a challenge regardless of the preceding reasons – a large-format work of art on paper. The fragility of the paper support, its deformation and mechanical damage, together with the instability of the drawing or painting in combination with the large format of the paper support, means a great deal for a conservator, not to mention "life after conservation", which is of utmost importance for works of art on paper. This not only concerns climatic conditions during storage, but also the method of storage, for example, if the paper is to be stored flat, hung, or stored in a roll. How often it will be moved and displayed is also a question of extreme importance as regards large-format objects.

In this paper, the authors present their latest experience concerning the conservation of drawing and painting on large-format paper supports. The focus is not on

each particular detail of the conservation treatment, but on providing an overall view of the process instead. The main task of this paper is to deal with the adjustment of flat, paper artwork on a new support, which, despite being a complex operation, is very important in securing its future life.

Case one: a collection of large-format drawings on wrapping paper by Milada Schmidtová

"In Czech modern art there are no longer any outstanding artists yet to be discovered. However, in recent years there has been a remarkable discovery of the work by an essentially unknown Milada Schmidtová (1922-2015), who was the daughter of the internationally recognized naïve painter Natálie Masliková Schmidtová (1895-1981)."[1] Milada became a femme fatale for a generation of young artists from the Baťa School of Art in Zlín and was well known for her attachment to Václav Chad, an outstanding painter executed during the 1940s by the Nazis. Later, she was expelled from the Academy of Fine Arts in Bratislava for political reasons and subsequently spent the second half of the 20th century living in seclusion. Her life-story could be the perfect theme for a Hollywood script. This, however, is not the subject of this article. After her recent death, a stunning drawing and painting oeuvre was discovered. This oeuvre was, unfortunately, marked by the very simple life of the artist who lived in poverty, secluded from the official art world.

More than a hundred drawings on paper from this collection had to be prepared for the first retrospective exhibition in 2017.[2] This was the famous *War Series,* "consisting of excellent drawings, which are considered today to be a unique contribution to the second wave of Czech surrealism from the war and post-war years",[3] together with *Figures*, an extensive series of large-scale drawings.

Fig. 1: M. Schmidtová, Narozeniny, before conservation-restoration (raking light)

Many of the works were in a very poor state. Milada Schmidtová worked from the depth of her soul, following a strong creative impulse more than the idea of a possible future artistic "coming out". She used cheap materials, wrapping paper, Indian ink, printing paints, felt-tip pens or colour pencils; she reworked her drawing many times, not hesitating to tear away the part she was not satisfied with to exchange it for a new addition. The drawings were damaged by improper long-term storage, often in rolls. The paper was soiled, stained, deformed, and often torn (Fig. 1).

Fifty-five large-scale drawings of the *Figures* series had to undergo a conservation-restoration process for the exhibition and in order to secure their "future life."[4] The process involved overall photographic documentation of the works, non-invasive research, and laboratory analysis

1 A. Pomajzlová (ed.), *Milada Schmidtová Čermáková (1922-2015), Chodkyně v mracích*. (Zlín: 2017), 151.

2 Pomajzlová (ed.), *Milada Schmidtová Čermáková (1922–2015), Chodkyně v mracích.* <A retrospective exhibition at the Regional Gallery of Fine Arts and the Gallery of Václav Chad in Zlín, 6.12. 2017–11.2. 2018>

3 Pomajzlová (ed.), note 1, 151.

4 Conservation-restoration and adjustment of the works of art were carried out at the Faculty of Restoration, University of Pardubice by students of the Studio of Conservation of Artworks on Paper under the supervision of Josef Čoban, academic painter and restorer, in 2017. Fifty-five large-format paper drawings underwent conservation-restoration and adjustment. The size varied from 825 × 750 mm to 1500 × 2200 mm.

Fig. 2: M. Schmidtová, Narozeniny, after conservation-restoration, recto

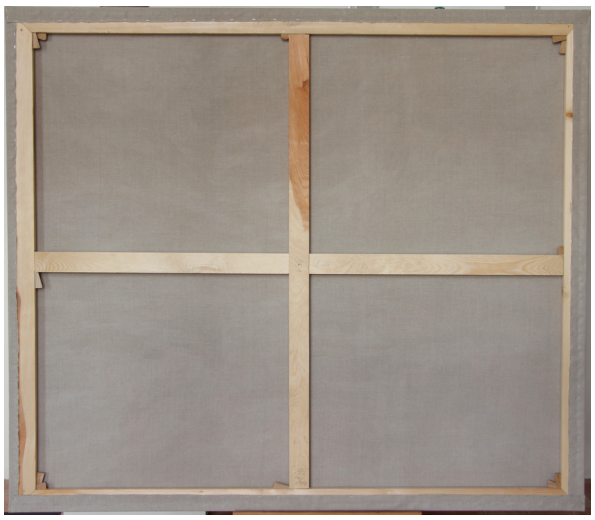

Fig. 3: M. Schmidtová, Narozeniny, after conservation-restoration, verso

of materials and media. The conservation-restoration was planned based on the results of the research and included: dry cleaning, fixation of the paint layer, flattening the paper support, as well as local or overall reinforcement with Japanese paper (Fig. 4). Infills of losses, retouching and adjustment to a new support were also part of the conservation strategy.

The adjustment was not meant to be temporary, or prepared just for the exhibition, but a long-term one (Figs. 2, 3). Special wooden panels were made for this purpose, each of which consisted of a light,

Fig. 4: M. Schmidtová, Na houbách, the backing of the drawing to the Japanese paper support

wooden frame made of spruce laths covered with 1 mm thick archive paperboard.[5] The paperboard was attached to the frame with Akrylep 545-2 acrylic adhesive and secured with stainless steel staples.

Each large-format drawing was mounted on the panel using Japanese paper.[6] The strips of Japanese paper were first glued along the perimeter of the back of the drawing and then on the backside of the panel. Tylose MH 6000 adhesive was used (Fig. 6).

Drawings carried out on a thin wrapping paper underwent such treatment without difficulty. However, there were large-format drawings and paintings carried out on a very thick paper. These works have been stored for years in rolls. They had to be treated differently due to substantial deformation of the paper support. Flattening the paper and stretching it on the panel using the aforementioned strip-lining system would not be sufficient due to the rolling tension of the paper. Drawings and paintings were moistened in a humidification chamber and dried under pressure afterwards. They were finally lined on a fine canvas using a starch paste and Tylose MH 6000 (2:1) (Figs. 5). Then the canvas was stretched on a stretcher (Figs. 2, 3), and the mounted work of art was framed using a simple wooden frame.

5 The board is marketed as Laurent.

6 Japanese paper Kawashahi.

Fig. 5: M. Schmidtová, Narozeniny, the backing of the drawing to the new linen canvas support

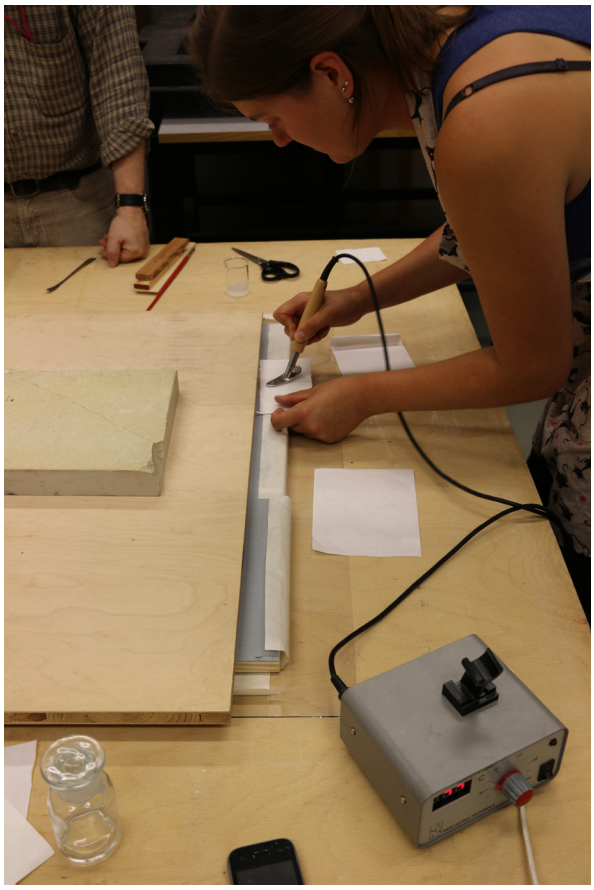

Fig. 6: M. Schmidtová, Na houbách, strip-lining of the edges of the paper

The series of restored drawings was stored in a depository under all the necessary climatic conditions.[7]

Case two: a map of Náměšť nad Oslavou domain

Large-format paper works of art displayed at historic sites very often suffer from unsuitable climate conditions. The Baroque map of Náměšť nad Oslavou domain is a typical example. The map is a part of an exhibition route through the unique Moravian chateau Náměšť nad Oslavou where it is displayed in the library located on the ground floor of the building. The map was made by Franz Lauer in 1756. It consists of twenty-four rectangular sections of hand-made paper lined on canvas. The whole 284 × 220 cm artefact is fastened to two horizontal wooden laths decorated with gilded capitals. The domain was drawn and painted on the paper with Indian ink and watercolour. Apart from the domain, the main motif of the map, the veduta and the coat of arms of the town, particulars of the donor, the manufacturer, the date and further circumstances concerning the execution of the map can be found at the edges of the map.

The artefact underwent overall conservation-restoration treatment in 2010 due to its alarming condition, primarily due to unsuitable climatic conditions during long-term storage and display at the chateau. Apart from dust and dirt and mechanical damage, vast deformation of the paper and canvas, tears and creases, missing parts and lacunas in the original material were observed. Microbiological damage was also a serious problem.

7 More on storing paper artefacts see: M. Ďurovič, *Restaurování a konzervování archiválií a knih* (Praha: Paseka, 2002), 83.

Non-invasive research and laboratory analysis of materials led to the following conservation strategy: separation of the paper parts from the canvas support, dry and wet cleaning of the paper and canvas, increasing of pH values, fixation of the paint layer, flattening the paper and canvas support, and strengthening the original paper by reinforcement using Japanese paper. Filling the losses of the paper support, retouching the paint layer and adjustment to the original laths, which also underwent conservation-restoration, were the last steps of the treatment.[8]

Although the treatment was carried out very carefully in 2010, as the conservation report proves,[9] problems in adhesion of the paper to the canvas support occurred recently. The paper was loosened from the canvas in many areas, creating hundreds of tiny "blisters" and creases all over the surface. Conservators observed the condition of the map and carried out a conservation concept,[10] which was based on analysing the most probable causes of the damage, which was the partial detachment of the paper from the supporting canvas. The causes seemed to be a high relative humidity at the site of the map's display and the use of an insufficient adhesive.[11] The further damage was probably caused by an inappropriate treatment of the blisters using a heating spatula and too much pressure.

The treatment included the following main steps:

- detaching of all the 24 paper parts of the map from the old canvas,
- removing the Tylose MH 6000 adhesive from the recto side of the paper parts,
- humidification using a humidification chamber, afterwards drying under pressure,

Fig. 7: Map of Náměšť nad Oslavou domain, state of preservation in 2018

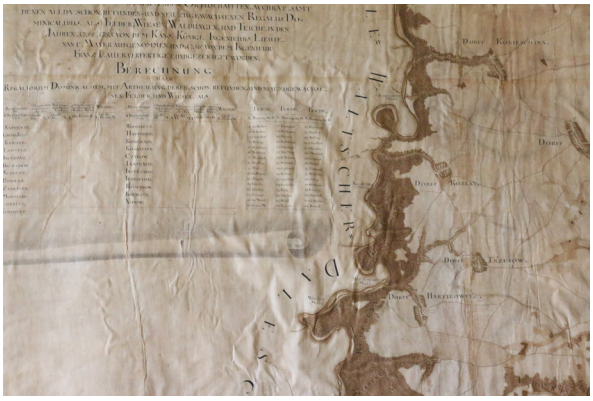

Fig. 8: Map of Náměšť nad Oslavou domain, detail, state of preservation in 2018

- backing of the paper parts with Japanese paper (18-22 g/m^2) using an adhesive mixture consisting of wheat starch and Tylose MH 6000 (2:1),
- infills using coloured paper pulp,
- backing of the paper with canvas using BEVA foil 25μ.[12]
- retouching of lacunas in the paint layer by water-colour or pastel.

The concept of the conservation-restoration of the map consists of these main

8 For more information see V. Kopecká – P. Šimánek, *Mapa – Panství Náměšť nad Oslavou*, conservation report (Litomyšl: Univerzita Pardubice 2010).

9 Kopecká – Šimánek, note 8.

10 J. Čoban, *Návrh na revizi restaurování Mapy panství Náměšť nad Oslavou* (Litomyšl: Univerzita Pardubice 2018, unpublished).

11 3% solution of Tylose MH 6000 was used for gluing the paper parts to the original canvas.

12 More on using BEVA foil for backing of paper supports see: P. Janská – M. Krausová, *Důlní situační plán – Project einer neuen Schacht-Anlage für die verebliche Theresia Tiefban Gewerkschaft in Brüx., conservation report* (Litomyšl: University of Pardubice, 2018). I. Homolová, *Srovnání vlastností laminačních fólií BEVA 371 a Filmoplast R*, bachelor's thesis (Litomyšl: University of Pardubice, 2009). V. Kopecká, 'Difficulties Related to Conservation of Modern Paper Artefacts', in: *Acta Artis Academia*, ed. By D. Hradil & J. Hradilová (Praha: Akademie výtvarných umění, 2012), 290-293.

steps, including a strict recommendation for the owner to follow a preventive conservation approach and to store and display the restored map in appropriate climatic conditions. The long-term quality of the treatment cannot be guaranteed without following these measures (Figs. 7, 8).[13]

Conclusion

As has been stated above, the conservation-restoration treatment of large-format works of art on paper represents a significant challenge for a conservator. Among typical problems of the material, such as fragility of the paper, deformation, mechanical damage and many others, those concerning handling large-format objects during conservation-restoration must also be mentioned.

Two case studies aimed at avoiding this hazard by making a proper backing to fragile works of art have been presented in this article. Backing of the paper artefact to a new support played a crucial role in the conservation-restoration of both examples: the drawings and paintings by Milada Schmidtová and the baroque map of Náměšť nad Oslavou domain. Apart from the relevant overall conservation-restoration treatment, securing the proper climatic condition for the life of the treated artefacts as a necessary measure for their long-term stability was emphasized.

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13 The conservation-restoration concept was accepted in 2018 by curators. The treatment has not begun yet.

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A MULTIDISCIPLINARY APPROACH TO CONSERVATION: A CASE STUDY OF IGNATIUS OF LOYOLA'S AUTOGRAPH *DIARIO SPIRITUALE*

Riassunto

Il *Diario spirituale* è un frammento autografo scritto da S. Ignazio fra il 1544 e 1545 e fortunosamente recuperato dopo la morte del fondatore della Compagnia di Gesù. Conservato–presso l'*Archivum Romanum Societatis Iesu* (ARSI) a Roma, il *Diario* presentava seri problemi di conservazione, in particolare a causa dell'azione acida degli inchiostri ferrogallici. Il restauro di manoscritti in presenza di questi inchiostri risulta sempre problematico e, di conseguenza, il progetto di intervento realizzato nel 2017 ha previsto il monitoraggio dell'opera prima, durante e dopo le diverse fasi del restauro tramite analisi non invasive (XRF e FORS) mirate a valutare innanzitutto l'eventuale reazione degli inchiostri ai trattamenti.

Keywords: Conservation treatment, chemical hydrogel, spectroscopy, manuscript, iron-gall ink

Introduction

The manuscript *Diario spirituale* is the only surviving autograph by Ignatius of Loyola, written in the years 1544-1545. The Diario was not intended for readers, and only a part of the original work was retrieved after Ignatius' death. The manuscript was therefore soon given the veneration due to a sacred object.

The surviving autograph written in Spanish by the founder of the Society of Jesus (the Jesuits) is today kept in the *Archivum Romanum Societatis Iesu* (ARSI) in Rome, bound in a volume (two sections: ff. 2-15 and ff. 16-27), together with the Italian version of the same text, written by the cleric Jean Viset in the first half of the 17th century (two sections: ff. 29-44 and ff. 45-56; f. 28 is a single blank leaf bound together with the third section).

The volume has a late tissue binding in silk, manufactured in the first half of the 18th century (Fig. 1).

The manuscript is composed of papers of various quality, and almost six different watermarks are observed in the autograph text (eagle, bird, anchor in the circle, siren and so on, Fig. 2, upper row). Iron gall inks used to write the text induced severe paper degradation, resulting in discolouration, ink diffusion through the leaf, and burn through, depending on paper quality and ink composition (Fig. 2, lower row).

In the first half of the 20th century, the manuscript underwent a deep repair aimed at limiting the corrosive effects of the iron gall inks: all the leaves, other than the blank

Fig. 1: *Diario's* silk cover (18th century)

ff. 42, 43 and 44, were lined on both sides with silk to prevent the risk of paper fragmentation (Fig. 3).

Unfortunately, nothing was done to counter the chemical aggression of the inks, and they continued to emit persistent VOCs (volatile organic compounds) and to cause damage. The use of hot liquid water-based gelatine for the silk application has somewhat accelerated the burn-through process, producing cracking and perforation in the inked areas: it induced overlap of *recto/verso*, transversal and lateral migration of the coloured ink compounds (with halo formation around the written), paper browning and adhesive stains, thus dramatically affecting the readability of the text.

This is why, in 2017, the manuscript underwent a new conservation treatment aimed at inhibiting the degradation and improving the general chemical physical and aesthetic condition.[1]

The project involved the participation of archivists, chemists and conservators and was conceived as an open project, which would be gradually outlined on the basis of data acquired from the analysis performed before, during and after the conservation steps by means of non-destructive and non-invasive spectroscopic techniques, in order to obtain information and to plan a punctual and suitable

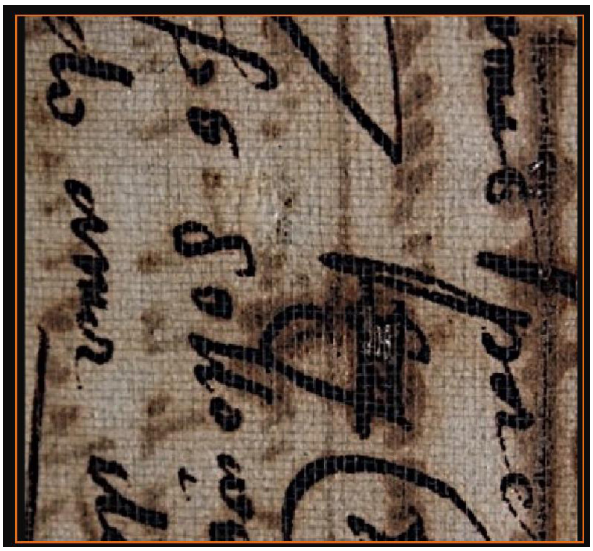

Fig. 3: Detail of the silk lining on the text

intervention procedure. This type of open project was already successfully tested in a previous intervention on the Ignatius of Loyola's *Exercitia Spiritualia*.[2]

In this work, we are focusing on paper and ink treatments, although the conservation intervention consisted of several steps, from documentation to binding repair and rehousing of the volume.

Results and discussion

At present, there is no consensus on the use of water-based treatments, and more data on iron migration in iron gall ink occurring in different procedures are required, particularly with respect to discolouration, and transverse (*recto/verso*) and lateral diffusion.[3],[4] Our analysis was based on a two-step approach: firstly, the

1 M. Zanetti, 'Il restauro del manoscritto autografo *Diario spirituale* di Sant'Ignazio di Loyola', in: *Dalla tutela al restauro del patrimonio librario e archivistico* (Atti del convegno, ed. by M. Zanetti, Ca' Foscari editions, Venezia, 2018), 231-256.

2 M. Zanetti, A. Zoleo, L. Nodari, M. Bronzato, 'Ignatius of Loyola's *Exercitia spiritualia*: Spectroscopic Monitoring and Nanomaterials for an Integrated Methodology on Ink-degraded Manuscripts', in: *Manuscript cultures-Natural Sciences and Technology in Manuscript Analysis*, 11 (2018), 49-62.

3 B. Reissland, S. de Goot, 'Ink corrosion: Comparison of currently used aqueous treatments for paper objects', in: *IADA preprints* (Preprints of 9th IADA Congress: Internationale Arbeitsgemeinschaft der Archiv-, Bibliotheks- und Graphikrestauratoren, Copenhagen 1999), 121-129.

4 V. Rouchon, B. Durocher, E. Pellizzi, J. Stordiau-Pallot, 'The water sensitivity of iron gall ink and its risk assessment', in: *Studies in Conservation*, 54 (2009), 236-254.

Fig. 2: Leaf fragments showing watermarks (first row, transmitted light) and degradation induced by iron gall inks (second row, reflection light). The images were taken after silk removal (see text)

characterization of iron-gall inks and paper was carried out to evaluate the reasons for the different degradation levels of the leaves. The second step was the evaluation of iron and ink distribution on the leaves before and after each intervention step to establish the impact, specifically for the water-based steps. To this purpose, we used X-Ray fluorescence (XRF) to probe iron distribution/diffusion, as well as the type of metallic ions present in the ink.[5]

XRF is a non-invasive spectroscopy widely applied to assess the distribution of metal ions in artefacts. It works only for elements with an atomic number larger than aluminium and is semiquantitative, i.e., it is able to quantify the relative amount of a specific ion in the same or similar material. It is based on the X-ray irradiation of a sample, which emits back X rays characteristic of the sample atoms.

To evaluate colour changes, we used reflectance spectroscopy in the ultraviolet-visible region with fibre optic equipment (Fibre Optic Reflectance Spectroscopy (FORS)). FORS is a straightforward, quick, non-invasive technique: a light in the ultraviolet-visible region is conveyed to a sample point, and the back-reflected light is analysed at each wavelength. The resulting spectrum can be compared with reference spectra of pigments and inks. Also, colour variations before and after specific treatments, as artificial ageing, wetting, oxidation, and so on, can be easily determined by means of this technique.

Seven *bifolia* from the autograph text (2-3, 6-13, 9-10, 16-27, 17-26, 19-24, 21-22) and three from the Italian translation (30-43, 34-39, 45-46) were selected for the analysis. The most damaged *bifolia* were 2-3, 6-13, 9-10, 16-27 and 21-22, all in the autograph part.

For each *bifolium*, 30 XRF points were sampled, 20 on the inked and 10 on the blank areas. Blank areas were on the leaf edges. On the most damaged *bifolia* (i.e.,

5 A. Zoleo, 'Le analisi spettroscopiche sul *Diario spirituale* di Sant'Ignazio in occasione del suo restauro', in: *Dalla tutela al restauro del patrimonio librario e archivistico* (Atti del convegno, ed. by M. Zanetti, Ca' Foscari editions, Venezia, 2018) 257-274.

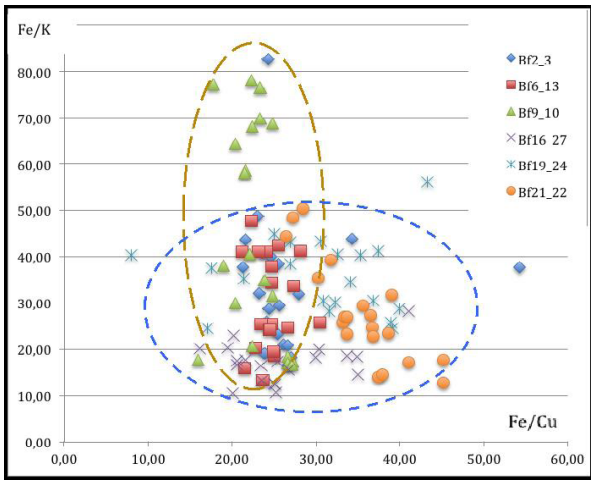

Fig. 4: Diagram showing the different clustering of the XRF-mapped points for the first three *bifolia* (2-3, 6-13, 9-10, in the brown circle) compared to the other *bifolia* (blue circle)

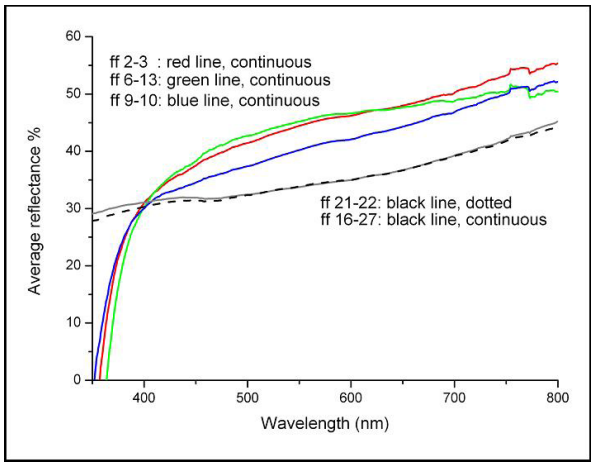

Fig. 5: Comparison between FORS spectra of the first three *bifolia* (2-3, red line; 6-13, green line; 9-10, blue line) and other two *bifolia* (21-22, 16-27) of the autograph text

the ones in the worst conditions), 20 out of 30 points were examined before and after each treatment. Globally, more than 300 XRF points were acquired.

As a first step, we applied XRF to evaluate the amount of the different ions in the ink writings before the intervention and in order to establish, if possible, a correlation between ink type and conservation condition of the *bifolium*. First of all, the best parameters to be used for the reliable identification of the inks were selected. A reliable identification should be based on robust and well-reproducible XRF signals. Since iron-gall inks were prepared with vitriol (i.e., iron sulphate, and gall extract), iron, copper, sulphur and potassium are the XRF-detectable, more abundant, and likely representative ions. Iron and sulphur come from vitriol, while potassium is commonly found in plants. Copper is commonly present with iron in the natural vitriol. The strongest XRF signals are from calcium and iron. A comparison between iron signals in blank and inked areas shows that iron is ten times more abundant in inks. Furthermore, its signals are well reproducible. Iron, therefore, gives an ink-representative XRF signal. Calcium is abundant, but its XRF signals are highly variable. Moreover, it is about twice as present in ink than in blank areas. It comes from a variety of sources, and it is not suitable for ink identification. In contrast, while copper is not very abundant, it is four times more abundant in ink and, overall, its amount is very well reproduced in inked areas. Therefore, its XRF signal is suitable as a representative parameter.

Potassium comes from the organic part of the ink. Potassium is found almost only in the ink and not on the leaf and therefore is indicative of ink. Furthermore, its amount is well reproduced in inked areas and is suitable for ink identification. Although sulphur could be an excellent ion for ink identification, it is almost undetectable in our conditions, and could not be used.

Based on these considerations, we used the XRF ratios of iron-copper and iron-potassium as identifying parameters for inks. We used XRF ratios of ink iron and leaf iron to evaluate iron diffusion before and after treatments.

The diagram in Fig. 4 reports the iron-potassium ratios against iron-copper ratios for the various *bifolia*.

Clearly, different clusters of points can be identified. Specifically, the *bifolia* 2-3 and 6-13, belonging to the first part, showed very similar iron-copper and iron-potassium ratios, indicative of similar recipes and material for the inks. The *bifolium* 9-10 has a slightly different iron-potassium ratio, indicative of different amounts, probably of

the same materials as for *bifolia* 2-3 and *bifolia* 6-13 (maybe a different preparation from the same materials).

However, no clear relation between ink type and *bifolium* conservation state was found, since the damaged *bifolia* 2-3, 6-13, 9-10, 16-27, 21-22 belonged to different cluster groups, although they were all in the autograph part.

Reflectance spectra were acquired on the inked areas of the *bifolia*. The spectral profile was very similar for the first three *bifolia* and was indicative of a black-brown ink (Fig. 5, red, green and blue lines). In contrast, for the other *bifolia* of the autograph text, the spectra of the inks were very flat, indicative of black-grey inks (Fig. 5, continuous and dotted black lines). This confirms what was already observed with XRF, i.e. the first three *bifolia* were written with similar inks.

After this first spectroscopic evaluation, the *Diario* underwent the first step of the intervention. Because of the critical condition of papers and inks, it was necessary to soften the adhesive to allow the safe mechanical traction of the silk. Controlled humidification was therefore achieved with the local application of a water-based chemical gel, characterized by a nanostructured network having very high water retention.

The action of this nanomaterial is limited to the interface: the penetration of water into paper and inks is gradual and controlled. Moreover, the gel transparency allows one to check the ink response during the treatment.[6],[7] As a result, the gelatine softened, and the silk could be removed by gentle mechanical action.

After this first step, on the more damaged *bifolia*, XRF and FORS measurements were carried out again on 20 points (15 inked + 5 blank) already sampled before the intervention.

Fig. 6: A bifolium positioned on the steel frame for drying at natural ventilation, magnetic pads all around its perimeter

In the areas of the *bifolia* presenting embrittlement, cracking, and fragmentation due to ink corrosion, once the silk was removed, it was necessary to increase the paper mechanical strength to allow the most damaged ink areas to undergo the following conservation steps, avoiding any additional risk related to the handling of paper and inks. The lightest-weight Japanese paper made from long kozo fibres (Tengujo, 2 g/m^2) was chosen to be applied with gelatine B 250 Bloom (hide gelatine, pH 6.5–7.0). It has been demonstrated that gelatine application on leaves can enhance the mechanical properties of paper and stabilize mobile iron ions present in the inks, bonding them into an elastic film and making them inert. To avoid the impact of the liquid water-based animal glue, a 2% solution was prepared by swelling the dry adhesive in cold water, heating it, letting it cool down and then pushing it through a steel sieve to obtain a creamy gel suitable to be used with brushing. After removing the silk, the surface pH was measured: the results varied between 4.20 and 5. We considered it necessary to counteract acidity connected to the iron gall inks by using a nonaqueous system and by providing an alkaline reserve acting in the paper as a buffer to contrast acids in the future.

To this aim, a dispersion of calcium hydroxide nanoparticles in isopropanol

6 *Nanotechnologies in the Conservation of Cultural Heritage. A Compendium of Materials and Techniques*, ed. by P. Baglioni, D. Chelazzi, R. Giorgi (Dordrecht: Springer, 2015), 117-144.

7 G. Poggi, N. Bonelli, R. Giorgi, P. Baglioni, 'La chimica dei nanocomposti e la loro applicazione al restauro dei manoscritti', in: *Dalla tutela al restauro del patrimonio librario e archivistico* (Atti del convegno, ed. by M. Zanetti, Ca' Foscari editions, Venezia, 2018).

Table 1: Average XRF counts for the ions K, Fe, Cu (chosen as representative parameters for the inks) before and after water-based treatments: the suffix *sv* means after silk removal; the suffix *da* after deacidification treatment.

	Bifolia						
	2-3	***2-3sv***	***6-13***	***6-13sv***	***6-13da***	***9-10***	***9-10sv***
Blank							
K	982	1344	546	715	464	354	807
Fe	4758	4430	5317	4223	3959	6122	6984
Cu	1017	996	811	564	519	941	631
Ink							
K	4042	4468	5229	6577	6092	2679	3800
Fe	92828	93530	142290	142079	142761	107945	118520
Cu	3520	3767	5637	5971	6053	4649	5317

at a concentration of 5 g/L was applied by brushing, granting a good penetration into the paper fibres.[8] Four applications were needed to reach neutral or slightly alkaline pH values (i.e., pH values between 7.50 and 8.50). The pH was checked on the same points 48–72 hours after treatment (i.e., the minimum time necessary for calcium hydroxide to turn into calcium carbonate) and the values remained constant. The introduction of a minimal amount of moisture was necessary to rehydrate the treated leaves, realigning deformations and restoring a planar surface. Indirect humidification by Sympatex was, therefore, performed.

As indirect humidification techniques are known to induce potentially significant chemical diffusion around the ink line and towards the paper *verso* side together with halo formation, special attention was paid to the duration of the treatment, reduced to some minutes, enough to uniformly relax the paper fibres. It should be emphasized that the permeability of paper and inks was sensibly reduced by the presence of high quantities of gelatine in and on the leaves. Once humidified, the leaves were positioned on a stainless steel frame (Fig. 6) employing magnetic pads all around their perimeter: this method induces paper fibres to flatten gently, reducing the risk of further mechanical damage. Starting from a very slightly damp state, paper fibre stretching induced by drying was minimum; moreover, weight pressure was avoided together with the risk of crackling fragile inked areas.

After this critical step, XRF measurements were carried out on the 20 sampled points of the most damaged *bifolia* (2-3, 6-13, 9-10, 16-27, 21-22).

The data in table 1 are the average of the XRF ion counts (XRF ion intensities) for the inked and blank points of each leaf: within the experimental error (which can be estimated around ±10% from repeated measurements), no variation of the XRF iron counts, and therefore no variation in the iron amount, are observed before and after the critical steps of silk removal and Sympatex humidification. As far as the ions in the inked areas are concerned, similar conclusions also hold for copper and potassium. To evaluate ink diffusion before and after Sympatex, FORS spectra were also acquired on the inks and nearby halos (1 mm from inked areas) for the most damaged *bifolia*. Within the experimental error, the FORS lines before and after treatment matched well. Minor variations were observed, mainly related to spectrum offset changes, which are due to small calibration errors, whereas ink diffusion should result in real changes in the spectral profile. This indicates that the wetting Sympatex treatment did not cause ink diffusion.

8 G. Poggi, R. Giorgi, A. Mirabile, H. Xing, P. Baglioni, 'A Stabilizer-Free Non-polar Dispersion for the Deacidification of Contemporary Art on Paper', in: *Journal of Cultural Heritage*, 26 (2016), 44-52.

Conclusions

In this work, a case study of a conservation project conceived as intervention followed by step-by-step spectroscopic monitoring was proposed. Modern hydrogel-based treatments combined with XRF/FORS single point analysis also provided a reliable and general protocol for future interventions in critical cases, such as interventions on manuscripts with iron-gall ink corrosion. Spectroscopic analyses showed that the "soft" hydrogel-based approach prevented the effect of ink and iron diffusion during the critical water-based conservation steps. XRF/FORS also provided a tool to distinguish different types of ink.

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ANALYSIS OF WORKS ON TRACING PAPER FROM A COLLECTION OF DRAWINGS BY LITHUANIAN ARTISTS

Résumé

Les fonds de la bibliothèque "Vrublevskiai" de l'Académie des sciences de Lituanie disposent de dossiers documentaires de valeur, partie du patrimoine culturel, parmi lesquels se trouve une collection de tableaux et d'esquisses des peintres lituaniens (signature LMAVB RS F320) conservée au Fonds des manuscrits. Cette collection s'étend de 1748 a 1970 et comprend 2386 œuvres conservées. Elle contient 24 œuvres de peintres du 19 siècle, effectuées sur papier calque. Les œuvres ont été analysées en appliquant les méthodes de microscopie optique, de ATR-FTIR et de SEM-EDX. Le pH du papier calque a été mesuré, les matières composantes, non organiques et celles qui ont été utilisées pour réaliser une copie ont été identifiées.

Keywords: tracing paper, ATR-FTIR, SEM-EDX

Analysis of works on tracing paper from a collection of drawings by Lithuanian artists

The Wroblewski Library of the Lithuanian Academy of Sciences (hereinafter referred to as the Library) has many valuable sets of cultural heritage documents. One of them is *The collection of drawings and sketches by Lithuanian artists* (signature LMAVB RS F320). Covering the period from 1748 to 1970, it is stored in the Manuscript Fund of the Library and contains 2386 storage units. This is a collection of different genres of works by authors who have lived and worked in the territory of the former Lithuania and Poland. The collection includes works by famous artists, such as Franciszek Smuglewicz, Jan Rustem, Kanuty Rusiecki (Fig. 1), Bolesław Rusiecki, Römers, Ivan Trutnev, Lew Antokolski, and others. Recently, the collection has attracted the attention of art scientists and historians of art and culture from various Lithuanian and foreign institutions.

Tracing paper (also called transparent paper), as a support is not much investigated in Lithuania, although documents on this type of paper are stored in many cultural heritage institutions in the country.

Although tracing paper is a relatively fragile type of support, sometimes the artwork made on it remains longer than a that on painted canvas does. For example, three of the collection drawings stored in the Library, are the draft versions of the religious painting *Evening at the Gate of Dawn*,

Fig. 1. Kanuty Rusiecki (1800–1860). Head sketch for the famous painting The Reaper. The 1850s. Tracing paper, ink, graphite pencil, 39×25.5 cm. LMAVB RS 320 1605

created by the famous student of Vilnius art school: Kanuty Rusiecki.[1]

History of tracing paper

The beginning of the use of tracing paper (also called transparent paper) in art is associated with the Renaissance period. In his tract *Il libro dell'arte*, an Italian painter, Cennino d'Andrea Cennini, mentions a type of paper that, when coated with the flaxseed oil, can be used for copying works of art. Up until the 19th century, tracing paper was not widespread and had no strictly defined requirements for its properties and was often produced by the users themselves. Only when the industrial production method of tracing paper was invented (in 1806 by Ralph Wedgwood) did its production and use increase dramatically, starting from 1820.

The production of all types of tracing paper is based on two main methods:

1) paper fibre or wet pulp is beaten to break and shrink the fibres and thus reduce the porosity and increase the transparency of paper,
2) already produced paper is coated or filled with a particular material that makes the paper transparent.

The following types of tracing paper are known:

- Parchment imitation – wood pulp is beaten for a long time, giving the end product transparency and resistance to water and dirt.
- Parchment paper (vegetable parchment) – is a type of paper, for which sulfuric acid or zinc chloride is used during its production.
- Oiled paper – paper is soaked in flaxseed or other oil.
- Resin paper – paper is soaked in resins.
- Onion skin – thin, slightly polished / glazed translucent paper, called this due to its resemblance to the thin outer shell of an onion.
- Manifold paper – the surface of the paper is coated with a layer of pigments (usually carbon fibre); the paper is soaked in oil to make it resistant and transparent.
- Waxed paper – the paper is soaked in a molten wax or paraffin bath.

Results and discussion

The object of this research is twenty-four works from the Collection LMAVB RS F320 by 19th-century artists, created on tracing paper. The works were investigated using ATR-FTIR, SEM-EDX, and optical microscopy techniques. Different parts of the artworks (paper used, materials used for its production, as well as tools for drawing on it) were examined and their composition determined.

1 I. Pajedaitė, 'Lietuvos dailininkų piešinių ir eskizų kolekcija', in: *Bibliografija: mokslo darbai. 2008/09*, (2011), 82-94.

Table 1. Results of analysis

No.	Metric	pH	Protein	Starch	Coating/ Impregnant	Inorganic coating	Material used for copying	Paper base
1.	LMAVB RS F320-1571	6,8	-	+	-	-	Charcoal pencil	Cellulose
2.	LMAVB RS F320-1597	6,7	-	+	Vegetable oil	-	Charcoal pencil	Cellulose
3.	LMAVB RS F320-1607	5,7	-	+	Venetian turpentine, Damara?,Oil (linseed?)	-	Charcoal pencil, graphite	Cellulose
4.	LMAVB RS F320-1614	6,1 (5,5)	-	+	Oil (linseed?)	-	Graphite pencil, HgS	Cellulose
5.	LMAVB RS F320-1685	6,8	-	+	Damara, Venetian turpentine?	-	Charcoal pencil	Cellulose
6.	LMAVB RS F320-1726	6,8	-	+	Wax?	$PbCrO_4$	Charcoal pencil	Cellulose
7.	LMAVB RS F320-1728	6,2	-	+	-	-	Graphite, charcoal pencil?	Cellulose
8.	LMAVB RS F320-1761	7,3	-	+	-	-	Graphite pencil , sanguine	Cellulose
9.	LMAVB RS F320-1762	6,4	-	+	Oil	Carbon	Graphite pencil	Cellulose
10.	LMAVB RS F320-1765	6,6	-	+	Oil	-	Graphite, charcoal pencil?	Cellulose
11.	LMAVB RS F320-1944	5,3	-	+	Oil (linseed?)	-	Graphite pencil, ink (Fe)	Cellulose
12.	LMAVB RS F320-1184	6,6	-	+	Oil (linseed?)	-	Graphite pencil, ink (Fe)	Cellulose
13.	LMAVB RS F320-1678	6,5	-	+	Oil	-	Graphite pencil	Cellulose
14.	LMAVB RS F320-1679	6,9	-	+	Damara, Venetian turpentine?	-	Charcoal pencil, ink	Cellulose
15.	LMAVB RS F320-1733	6,1	-	+	Damara, Venetian turpentine?	-	Charcoal pencil, sanguine	Cellulose
16.	LMAVB RS F320-1632	7,1	-	+	-	-	Charcoal pencil, ink	Cellulose
17.	LMAVB RS F320-742	7,0	-	+	Oil (linseed?)	-	Graphite, charcoal pencil	Cellulose
18.	LMAVB RS F320-1555	6,9	-	+	-	-	Pencil, sanguine	Cellulose
19.	LMAVB RS F320-1681	6,8	-	+	-	-	Charcoal pencil, sanguine	Cellulose
20.	LMAVB RS F320-1603	6,2	-	+	Oil (linseed?)	Fe_2O_3/FeO(OH)/ $PbCrO_4$	Graphite pencil	Cellulose
21.	LMAVB RS F320-1605	6,6	-	+	-	-	Graphite pencil, ink	Cellulose
22.	LMAVB RS F320-1560	6,6	-	+	-	-	Graphite pencil, sanguine	Cellulose
23.	LMAVB RS F320-1613	6,9	-	+	-	-	Graphite pencil, ink	Cellulose
24.	LMAVB RS F320-1570	6,3	-	+	Damara, Venetian turpentine	-	Pencil, ink	Cellulose

Following analysis of the paper of the drawings, it was defined that in most cases, irrespective of the original production method, the papers' pH is neutral or close to neutral. More significant changes of pH are noticeable in cases of documents LMAVB RS F320-1614, LMAVB RS F320-1944, and LMAVB RS F320-1607. A lower pH value of paper in document LMAVB RS F320-1614 can be linked with the HgS pigment used in drawing process; in document LMAVB RS F320-1944 with ink destruction; LMAVB RS F320-1607 with the destruction of paper impregnation material (oil).

Inorganic coatings ($PbCrO_4$ (document LMAVB RS F320-1726), carbon (document LMAVB RS F320-1762) and Fe_2O_3/FeO(OH)/ $PbCrO_4$ (document LMAVB RS F320-1603)) have no significant influence on papers' pH. Prevailing pH values in tracing paper are close to neutral. This shows that in many cases, from the chemical point of view, paper is rather stable. Mechanical damage is the main problem.

It is defined that in the production process of tracing paper, starch was used as a sizing material. For impregnation coating, various oils, turpentine, and damara resin were used; in the case of document LMAVB RS F320-1726, wax might have been used.

Information achieved in the course of the investigation about the composition of tracing paper documents and materials for copying aids the restorers in learning more about the objects, and in choosing suitable methods and materials for conservation and restoration.

The results of the analysis are presented in the table 1.

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TECHNICAL DRAWINGS: CONSERVATION TREATMENTS

Zusammenfassung

Technische Zeichnungen liefern wichtige Erkenntnisse über den kreativen Entstehungsprozess, sagen aber auch viel über den Zeitgeist ihrer Entstehung aus. Oftmals sind sie auch die einzigen Dokumente bezüglich Bauten und Landschaften, die nicht mehr existieren oder nicht mehr so erhalten sind. Einige technische Zeichnungen in unserer Sammlung sind aufgrund der schlechten Materialqualität sowie unsachgemäßer Hantierung und Lagerung beschädigt. Konservatorische Maßnahmen wurden für einzelne Objekte individuell erstellt, dabei wurden ästhetische Anforderungen sowie praktische Nutzungsbedingungen für die wissenschaftliche Bearbeitung berücksichtigt.

Keywords: technical drawings, tracing paper, damage, conservation and restoration

Introduction

Technical drawings provide an essential insight into the creative process involved in their making, both in terms of materials used and content described and, furthermore, are often all that we are left with to remind us of man-made and natural landscapes that have ceased to exist.

In its collection SI AS 50-Ljubljana Building Directorate, the Archives of the Republic of Slovenia keeps a collection of graphic documents, the majority of which date back to the 19th century. They were commissioned by the state for the purpose of regulating and maintaining the Sava River basin. Today, they are regarded as one of the first proper urban planning drawings in the Slovenian territory.

Apart from being rich and detailed in the technical aspect, the drawings are also meticulous in terms of graphic techniques. By using shading, colouring, and drawing of imaginary decorative items of greenery and other aesthetic additions, such graphic illustrations sometimes became true works of art.

As far as the material aspect is concerned, our paper heritage consists of paper support, which acts as a message carrier, and of records, which can be written, drawn, painted, or printed.

Unfortunately, some of these documents in our collection are now severely damaged due to the poor quality of paper support and their frequent and inexpert use.

Conservation-restoration treatment is adjusted to each drawing separately and depends on several aesthetic and practical requirements.

Tracing paper

The technical drawings discussed here are drawn on tracing paper. Transparency of paper can be achieved with several different processes, whose sole purpose is to fill in the space between fibres and so prevent the light from dispersing when being transmitted through paper. By creating a more homogenous medium, the refractive index of paper comes closer to that of the air, which is why paper becomes more transparent.

Transparency of paper can be achieved through several different procedures, which have changed and interacted with each other from the 15th century to the present day:[1]

- by coating paper with oil, resin or wax,
- by the intensive beating of paper pulp (parchment substitute),
- by immersing paper in sulphuric acid (vegetable parchment),
- by calendering paper made of heavily beaten fibre suspension (tracing paper and pergamine paper)

Such processes, employed to achieve the desired transparency, produced many shortcomings and harmful effects for the permanence and durability of paper. Heavy beating of cellulose pulp and chemical processing causes changes in paper colour, causing breaks and tears and making the paper less flexible and highly sensitive to humidity.

One of the main characteristics of tracing papers is their high sensitivity to humidity. Such papers do not have characteristic interspaces, which causes them to swell when in touch with humidity. As fibres cannot spread on the inside into air interspaces, since the paper has none due to all the air being excluded from the internal structure of the paper to achieve transparency, they spread on the outside and cause the paper to distort and change its dimensions.

Changes in the scale in technical and architectural drawings, caused by inappropriate climate, storage conditions or incorrect conservation-restoration interventions, can have consequences for any study or reconstruction of architectural dimensions and proportions. [2]

During the mid-19th century, when the two restored technical drawings presented here were created, a new procedure to make the so-called vegetable parchment was invented. Vegetable parchment was made by immersing absorbent paper in sulphuric acid. Cellulose fibres were dissolved into a gelatinous mass, which, once dried, resembled parchment. At first, mainly cotton fibre was used for the production of vegetable parchment. [3]

It is sometimes difficult to identify the exact type of tracing paper, since they are often the product of the combinations of many different manufacturing processes.

Conservation and restoration of two technical drawings

During usage and storage of records on tracing paper, numerous different types of damage may occur, caused by interacting external and internal factors. Such paper may be damaged by light, humidity, temperature, inappropriate use, and the natural ageing process.

In the conservation and restoration treatment of tracing paper, we apply the same principles as in the conservation of all other documents (cultural monuments) on paper, but they are somewhat adjusted to the characteristics of tracing paper. The sensitivity of such paper to humidity requires the careful use of glues that include water, and we also need to make sure to retain the characteristic transparency of a document.

In addition to being fragile, stained and highly sensitive to humidity, as well as having numerous tears and missing parts, the two technical drawings discussed here were also heavily wrinkled (Fig.1, Fig. 2.). Before dry cleaning, we thus needed to flatten wrinkled areas by applying controlled humidity in a

1 C. Laroque, *The Paper Conservator: History and analysis of transparent papers* (2004), 18-24.

2 T. Rahovsky Šuligoj, 'Gradivo na prosojnih papirjih', v: *Pol stoletja* (Ljubljana: Arhiv Republike Slovenije, 2006), 62.

3 Laroque, note 1, 19.

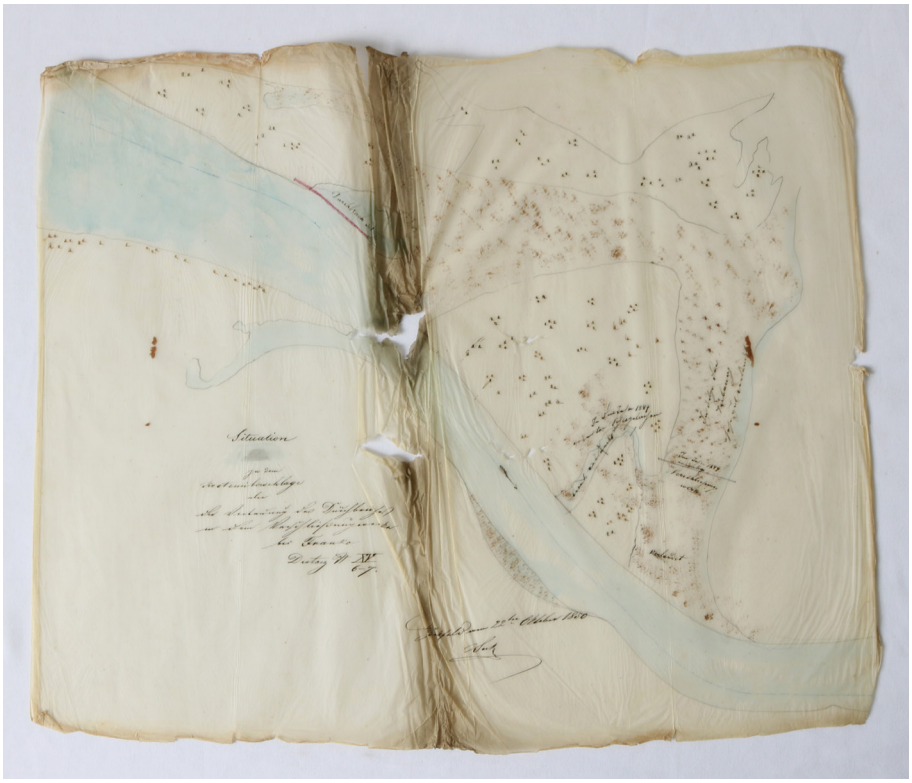

Fig. 1: Plan of regulating and maintaining the Sava River (18/45/1) before the conservation treatment (photo by Lucija Planinc)

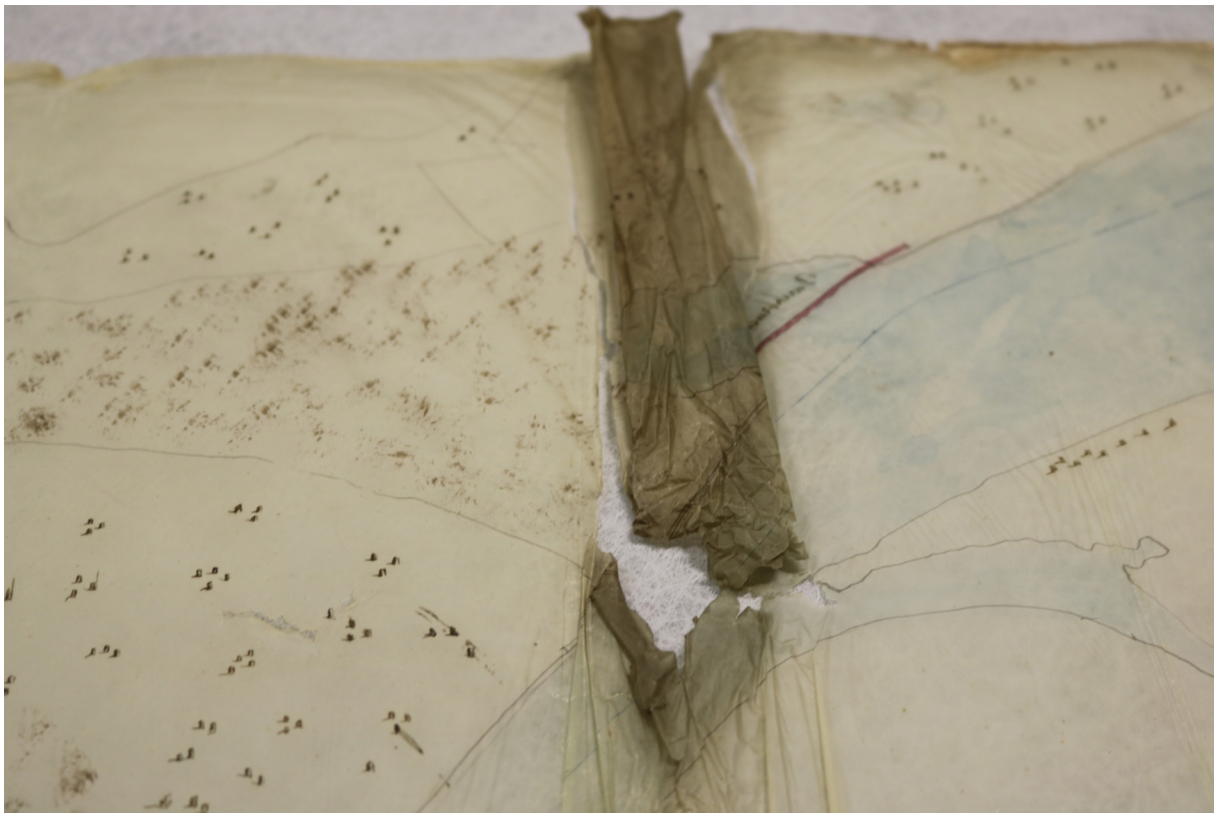

Fig. 2: Plan of regulating and maintaining the Sava River (18/45/1) before the conservation treatment – detail of damaged segment (photo by Lucija Planinc)

Fig. 3: Plan of regulating and maintaining the Sava River (18/45/1) after the conservation treatment (photo by Lucija Planinc)

humidity chamber. After the drawings had been flattened, they were dry cleaned with an eraser. Missing parts were then inserted with strips of Japanese paper and starch paste on the verso side. We controlled the item's sensitivity to water by working on smaller areas. After the object was restored, it was placed in a folder made of archival paper, which serves as a support and protection (Fig. 3.).

In the restoration of documents on tracing paper, it is essential to preserve their transparency, avoid any changes in their dimensions, provide support and facilitate handling during storage and use. They need to be used and kept in an environment in which climatic conditions are strictly controlled. Storage equipment has to be dimensionally adjusted to accommodate large-formats of such records so that originals can be stored without being folded or rolled. Such documents have to be kept in folders made of permanent paper and, if possible, digitized and made available for the public on digital media.

When originals are made available for viewing, it is important to inform and educate those who will be handling such records (technical staff, archivists, users in archival reading rooms, and people involved in digitization), about the importance of the proper handling of such records, so as to justify their time-consuming and expensive conservation-restoration treatments.[4]

Archivists at the Archives of the Republic of Slovenia (those in charge of the archival fonds SI AS 50 – Ljubljana Building Directorate) follow the instructions provided by conservation-restoration experts on how to protect and store collections of technical drawings. They systematically appraise such documentation, take care of its conservation and restoration, and its placement in folders made of permanent paper. Currently in progress is also the digitization of the fonds SI AS 50 – Ljubljana Building Directorate, from which the two technical drawings presented here were selected.

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4 Rahovsky Šuligoj, note 2, 66.

Fiona McLees

FROM AUTHOR'S DRAFT TO SELECT LIBRARY HOLDING: THE METAMORPHOSIS OF FRANZ KAFKA'S MANUSCRIPTS

Riassunto

La Biblioteca Bodleiana possiede la maggior parte dei manoscritti esistenti di Franz Kafka (morto nel 1924), incluse le bozze per *Das Schloss* (*Il Castello*), *Der Verschollene* (*America*) and *Die Verwandlung* (*La Metamorfosi*). Il progetto di conservazione di questi manoscritti e' iniziato nel 2008, nonostante la difficolta' nel trovare adeguati trattamenti di conservazione che potessero preservare l'evidenza del modo di lavorare di Kafka e la storia successiva della collezione. Questo articolo esamina gli aspetti materiali di questi quaderni, cio' che rivelano circa il loro passato e come i trattamenti di conservazione siano stati in grado di ritenere questa evidenza e allo stesso tempo abbiano anche garantito la stabilita' dei manoscritti. Inoltre l'articolo si propone di evidenziare la sconnessione interessante fra come un manoscritto sia considerato dal suo autore e come sia trattato una volta diventato parte di una rinomata collezione bibliotecaria.

Keywords: Kafka, Materiality, Literary Archives, Modern Materials, Conservation

Introduction

Many authors may not have foreseen that future interactions with their writings would include the reverential study of their original manuscripts in the pursuit of extracting every possible scrap of available information. Franz Kafka (1883-1924) is unlikely to have anticipated how his manuscripts would become subject to intense examination after his death, especially as he left (unfulfilled) instructions to his friend Max Brod to burn the majority of his manuscripts.[1] He would perhaps be even more surprised to discover that the largest portion of his notebooks would travel to Tel Aviv with Brod, then later to Switzerland, eventually finding a home in England in the Special Collections of the Bodleian Library[2] (University of Oxford), due in part to the influence of the noted Kafka scholar Sir Malcolm Pasley (1926-2004). Not only the marks Kafka made on the page but also the very materials of the notebooks themselves have now been scrutinized for every possible clue to reveal more about him and his writing process (Fig. 1). As his biographer Reiner Stach says;

1 Kafka's requests to Brod are well documented. For an example, see R. Stach, *Kafka: The Years of Insight*, trans. by Shelley Frisch (Princeton: Princeton University Press, 2015), 475-476.

2 The Kafka collection at the Bodleian comprises 55 shelfmarks in total: Oxford, Bodleian Library, MSS. Kafka 1-55.

> No author at the beginning of the twentieth century – least of all Kafka himself – could have imagined that his written legacy would soon be measured, photographed, and described as though it were a set of papyrus rolls from an Egyptian burial chamber, and abstract interest in the medium and materiality of the sign was alien to that generation.[3]

Kafka wrote in shop-bought notebooks of varying quality with probably little thought for the posterity of these items, tearing out pages, doodling in the margins, combining laundry lists[4] and Hebrew homework[5] with his literary writings. As can be expected, the early 20th century papers in these notebooks are often brittle and fragile, and frequently combined with wire staples and other poor-quality materials that have degraded either due to natural ageing or handling and storage conditions. Coupled with this are visible traces of the manuscripts' histories: not only the hand of Kafka but also the interventions of Brod. This past life is evident both in inscriptions and inserted notes, and also on occasion in the form of damage or repair; for example, MS. Kafka 39, fol.47 exhibits some deliberate cuts through the paper, which have then been repaired on the verso by pieces of a Palestinian stamp (Fig. 2). Any conservation treatment of these manuscripts would, therefore, need to respect and negotiate the signs of working processes left by Kafka and Brod, whilst attempting to conserve the deteriorating 20th-century materials used.

This study will consider the outcomes of conservation treatment when working with manuscripts such as these, by considering how even minor remedial interventions may have a more significant effect upon

Fig. 1: Examples of bound materials from the Kafka collection (Oxford, Bodleian Libraries)

intangible qualities as perceived by the end-user, or "stakeholder".[6] To make this assessment, one needs to consider the variety of meanings that can be superimposed upon these manuscripts – especially those that might be important to the relevant stakeholders (for example, curators, scholars, and visitors to the Bodleian's galleries). Conservation theory proposes a variety of ways to understand values attributed to heritage objects, but it is notable that very few of the most significant texts focusing on conservation theory give examples of written documents or paper archives within their range of case studies.[7] Of course, theories can be extrapolated and applied to different types of objects but most assume either visually artistic artefacts, or at least objects that were intended to be viewed by others (whether a cup or a suit of armour), whereas the Kafka drafts do not fall easily into either of these categories.

Moving outside the realms of conservation theory, an especially apposite view on the values peculiar to literary archives

3 Stach, note 1, 32.

4 Online catalogue entry for Oxford, Bodleian Library, MS. Kafka 26. http://www.bodley.ox.ac.uk/dept/scwmss/wmss/online/modern/kafka/kafka.html [accessed 25.06.2019]

5 Online catalogue entry for Oxford, Bodleian Library, MS. Kafka 24. http://www.bodley.ox.ac.uk/dept/scwmss/wmss/online/modern/kafka/kafka.html [accessed 25.06.2019]

6 This term is used by Salvador Muñoz Viñas, amongst others, to describe "the people for whom a heritage object is meaningful" S. Muñoz Viñas, *Contemporary Theory of Conservation* (Oxford: Elsevier Butterworth-Heinemann, 2005), 160.

7 For example, see B. Applebaum, *Conservation Treatment Methodology* (Oxford: Elsevier Butterworth-Heinemann, 2007), C. Caple, *Conservation Skills: Judgement, Method, and Decision* (London: Routledge, 2000) and *Conservation: Principles, Dilemmas and Uncomfortable Truths*, ed. by A. Richmond and A. Bracker, (Oxford: Butterworth-Heinemann in association with the V&A, 2009). These three texts offer many different case studies and discussions of widely varied types of objects, but with no article or chapter dedicated to literary or archival heritage.

can be found in the words of someone perhaps uniquely placed to discuss literary drafts: the 20th-century English poet Philip Larkin (1922–1985). A poet, novelist, and librarian within a university library, he could almost be viewed as an "über" stakeholder with regard to literary archives, having created them, consulted them, and cared for them. He puts forward two primary values of literary manuscripts in the following words:

> All literary manuscripts have two kinds of value: what might be called the magical value and the meaningful value. The magical value is the older and more universal: this is the paper he wrote on, these are the words as he wrote them, emerging for the first time in this particular miraculous combination [...] The meaningful value is of much more recent origin, and is the degree to which a manuscript helps to enlarge our knowledge and understanding of a writer's life and work. A manuscript can show the cancellations, the substitutions, the shifting towards the ultimate form and the final meaning.[8]

This could be clarified further by saying that the *magical* value is the tactile, intimate, almost spiritual experience of holding the manuscript and seeing how Kafka's pen pressed into the paper, or viewing his marginal doodles, as opposed to seeing the edited, typeset, printed version of his stories. An example of his second value, the *meaningful* value, can be found in MS. Kafka 34 (a draft for *Das Schloss*) where, in numerous places, the first-person pronoun *ich* ("I") was amended and changed to "K", a third-person narrative voice; another example of extracting meaningful value can be seen in Pasley's research into dating passages of *Der Process* by counting words on the page.[9]

This paper will use these two values as a framework or lens through which to evaluate the results of a selection of conservation treatments undertaken upon the Kafka manuscripts. However, to this will be added a third and final value, which is of particular relevance to conservators: the purely *material* value of the object, which is the conservator's remit to preserve regardless of whether it contributes to the spiritual or intellectual experience of the manuscript. For example, small fragments of adhesive and fibres which sit detached in the gutter, or broken sewing threads that cannot be reintegrated into the structure. Taking three of the Kafka manuscripts as examples, this paper will briefly present the conservation treatments undertaken whilst attempting to preserve these three values, and will then evaluate the outcomes from the perspective of the end-user or stakeholder.

Case study 1: Oxford, Bodleian Library, MS. Kafka 39

MS. Kafka 39 is one of six notebooks containing the draft for *Das Schloss*, dating from 1922. It reveals many details that exhibit its "magical" and "meaningful" aspects: Kafka's ink smudges and notations on the endleaves, amendments and eradications to the text, Brod's repair using a postage stamp, and also original physical qualities such as the dark blue edge-colouring of the textblock, which could be important for identifying the source of loose leaves found elsewhere in the collection. The manuscript had several loose leaves of its own: fol. 37 had been torn out, with a stub still in place in the notebook, whilst fols. 42-47 had also been torn out but with no stubs remaining to which they could be reattached. It is evident that this latter group of folios had been written on prior to being torn from the notebook, and it is also worth noting that the text on these pages appears upside down and running in the opposite direction to the foliation, as Kafka had turned the notebook around and started writing

8 P. Larkin, 'A Neglected Responsibility: Contemporary Literary MSS', in: *Encounter*, vol. 53, issue 1 (July 1979), 33-34. Available online at http://www.unz.com/print/Encounter-1979jul-00033/ [accessed 25.06.2019].

9 Stach, note 1, 33.

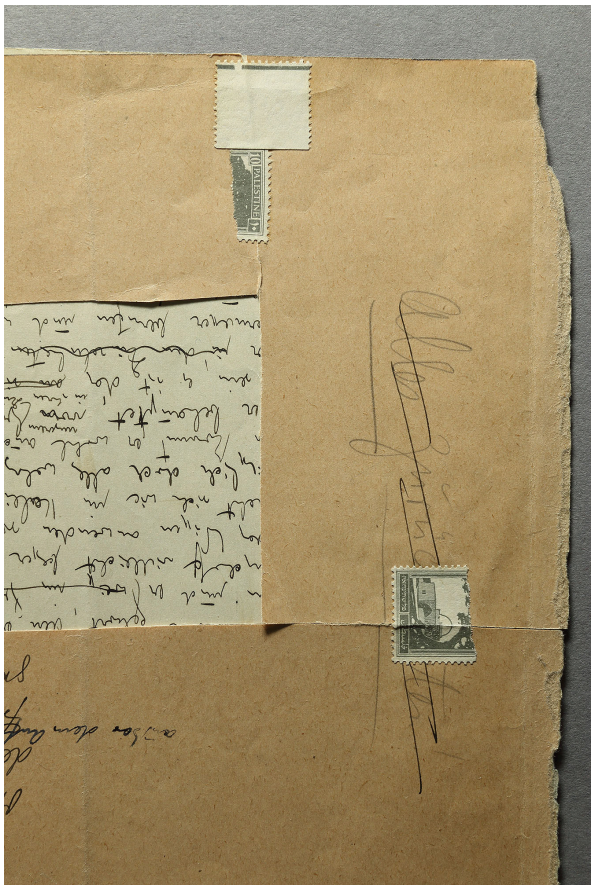

Fig. 2: Cuts to folios and repair using a postage stamp (Oxford, Bodleian Libraries, MS. Kafka 39)

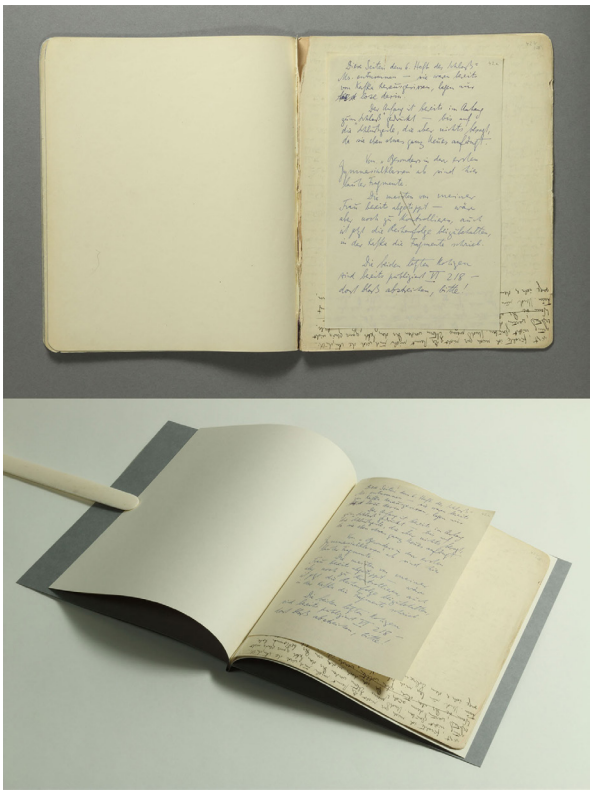

Fig. 3: Detached folios in MS. Kafka 39. Upper: before conservation, detached folios in-situ. Lower: after conservation, folios rehoused using the "fisherizing" technique (Oxford, Bodleian Libraries, MS. Kafka 39)

from the back. Additionally fols. 46 and 47 have several deliberate cuts through the paper, which had been partially repaired with the aforementioned Palestinian stamp.

It was decided to reattach fol. 37, as the tear profile of the leaf could be matched precisely to the stub, and for handling and security reasons it would be less vulnerable if reintegrated into the textblock. The colour of the detached paper appears noticeably darker compared to the stub in the notebook, suggesting that it must have been stored separately for some time, which may provide further insight to scholars. Tengujo 5gsm[10] and wheat starch paste were used to reaffix the folio, and evidence of the discoloured paper remains very clear to anyone consulting the manuscript.

The group of loose fols. 42-47, together with an inserted note in Brod's hand found between fols. 41 and 42 (Fig. 3), posed a different problem, as there were concerns about the risks of keeping them loose but no stubs present to reattach them to within the notebook. Fasciculing[11] was proposed but dismissed as the majority of the text was on the verso of these folios, meaning that readers would largely encounter the blank rectos and have to turn each page to view the upside-down text. As an alternative method of housing the loose leaves, "fisherizing"[12] was undertaken: this method has the additional advantage of there being no support pages to disturb the flow of the

10 Available from https://www.preservationequipment.com/

11 For a description of this technique see H. Lindsay and C. Clarkson, 'Housing single-sheet material: The development of the fascicule system at the Bodleian Library', in: *The Paper Conservator*, 18 (1994), 40-48.

12 For a full description of this technique see A. Honey, 'Housing single-sheet material: "Fisherizing" at the Bodleian Library, Oxford', in: *The Paper Conservator*, 28 (2004), 99-104. Also available online at https://ora.ox.ac.uk/objects/uuid:3c420c6e-666d-4ff7-9699-a6d0113b3b30

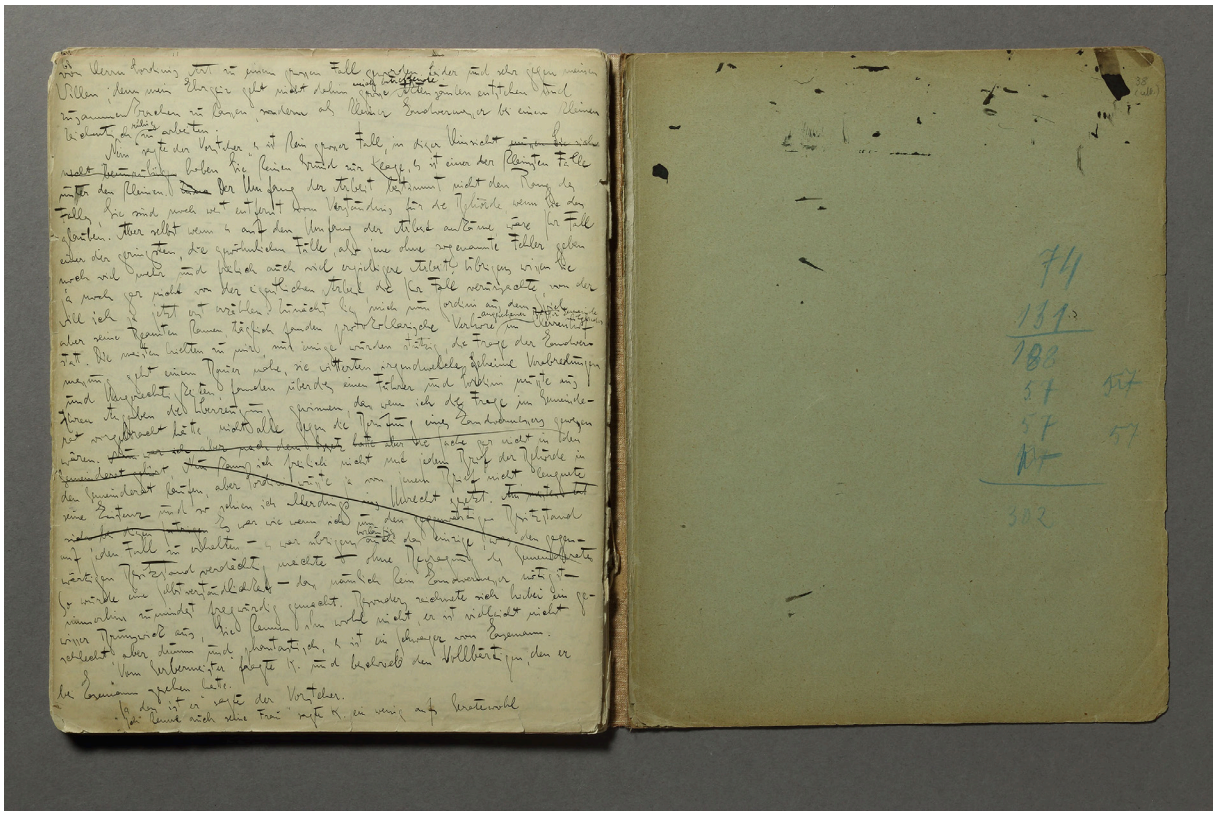

Fig. 4: Historic evidence including ink splashes, amendments, and editor's blue pencil on fols. 37b and 38a (Oxford, Bodleian Libraries, MS. Kafka 34)

original folios, meaning the fisherized booklet can be turned around and read from the back, as it would have been in the notebook. Briefly, the inserted note and folios were each guarded with strips of Hasegawa paper[13] (3.3-3.4 monme[14]), which are folded (to provide depth compensation), then attached together using two paper twists pierced through the guards. Single bifolio endleaves were attached using linen thread, the spine protected with a strip of Hasegawa, and finally a Manila cover was folded and adhered to the spine. The fisherized module is stored in the same 4-flap folder as the bound portion of the notebook, allowing easy consultation.

Case study 2: Oxford, Bodleian Library, MS. Kafka 34

This is another one of the *Das Schloss* notebooks and again contains many engaging details and historical evidence, such as black ink splashes all over the endleaves; Brod's blue editorial pencil; and of course Kafka's deletions and amendments. The cover was completely detached from the textblock, whilst the textblock itself comprises only one sewn quire and one other complete bifolio, with the rest of the manuscript being single leaves with torn gutter edges. Closer examination revealed that the loose leaves (fols. 15-37) came from as many as six different notebooks, as evidenced by varying dimensions, discrepancies between the presence or lack of watermarks, and different edge colourings to the pages.[15] Moreover,

13 Available from http://www.washikobo.com/index.html or https://store.hiromipaper.com/pages/online-store

14 A Japanese unit of weight. 1 monme is roughly equivalent to 3.75g.

15 Scholars have been able to positively identify two of the source notebooks: see online catalogue entry for Oxford, Bodleian Library, MS. Kafka 34 http://www.bodley.ox.ac.uk/dept/scwmss/wmss/online/modern/kafka/kafka.html [accessed 25.06.2019].

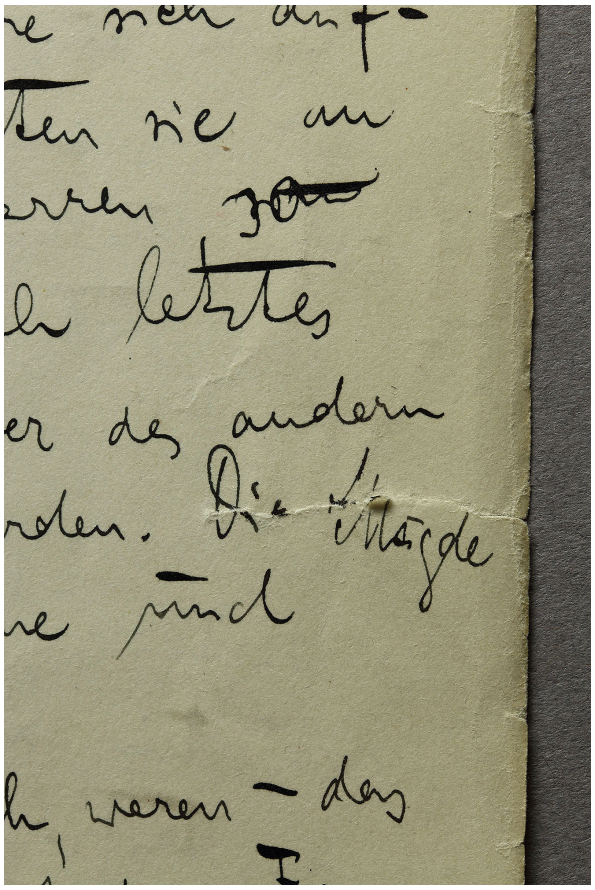

Fig. 5: Fol. 28, Kafka's handwriting stumbles to negotiate the existing tear (Oxford, Bodleian Libraries, MS. Kafka 34)

often Kafka's ink has seeped into the damaged and torn edges of the paper, especially in skinned areas at the gutter edge, thus revealing that many of the folios were already loose and detached when Kafka was writing (unlike the loose leaves in MS. Kafka 39).

One such folio (fol. 28) presented an edge tear, which upon closer inspection showed that no matter which way the scarfed edges were aligned, the lines of ink lettering did not join up, indicating that the tear was in place at the time of Kafka's writing. This tear was therefore not repaired; instead, it was reinforced using 2gsm Berlin tissue[16] to bridge the active end of the tear and prevent it extending further during handling.

It was clear that other damage present had been caused later in the manuscript's lifetime. The foredges of several of the loose leaves were curled, folded over, and with small edge tears as they had projected beyond the covers slightly and been more susceptible to sustaining damage. In some places, the folded areas slightly obscured writing, and the tears presented a minor risk as they could extend further; therefore minimal repairs were undertaken using 2gsm Berlin tissue and wheat starch paste, restoring full visibility to the text.

The question of how the loose leaves within MS. Kafka 34 should be housed was addressed in a different way to Case study 1, MS. Kafka 39. As mentioned above, many of the leaves contained within the cover did not originate from the bound notebook so could not be attached within that structure. Equally, to rehouse them in a separate binding did not seem suitable as it would have such a significant impact on the appearance and nature of the object, leaving only 14 folios within the cover. As Kafka appeared to have written on many of them as loose leaves, it was decided to leave them as they were, inserted in foliated order between the covers. Security concerns were assuaged as it was established that any scholar viewing the original manuscripts would be well-supervised. An archival paper wrapper was made to ensure that the foredges of the loose folios had better protection and to prevent them from slipping too much within the cover.

Case study 3: Oxford, Bodleian Library, MS. Kafka 40

MS. Kafka 40 is a slender notebook containing the text of several short stories. Its appearance is notable as it has a partial paper wrapper adhered to the cover using Brod's headed notepaper with his Tel Aviv address printed in both English and Hebrew. Adding to the intimate, "magical" experience of handling this notebook are details such as the stationer's stamp from the shop where Kafka purchased the book and his own pencil doodles in the margins. Other particulars may provide "meaningful" value for scholars, such as the use of different media

16 Available from http://www.atlantis-france.com/en/

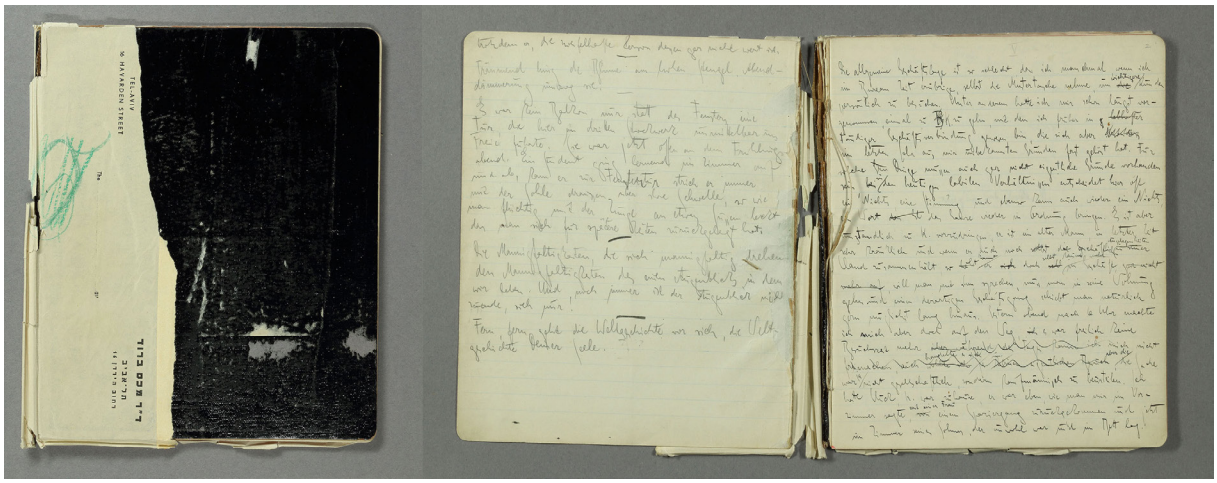

Fig. 6: MS. Kafka 40 before conservation. Left: front cover, with Brod's headed notepaper used as a wrapper. Right: manuscript open to folios 1b and 2a, with damage to Brod's repair visible at centre (Oxford, Bodleian Libraries, MS. Kafka 40)

(pencil and ink) in different places and the presence of physical evidence indicating at least one missing quire.

Another detail, hitherto unknown, was discovered during examination: beneath Brod's paper wrapper is an area of adhered paper fibres with fragments of handwritten text just visible. Elsewhere in the Kafka collection, there is evidence that many of the notebooks had become stuck together and later peeled apart (perhaps the heat or humidity in Tel Aviv had caused the covers to become tacky) and presumably a similar incident is the cause of a fragment of paper becoming attached to the exterior of this notebook. As it potentially represents an unknown portion of writing by Kafka, in agreement with the curators, it was decided to investigate whether the fragment extended any further beneath Brod's paper wrapper.

Hyperspectral imaging was undertaken in-house; however, it did not reveal whether there was further text hidden beneath the paper wrapper, and was deemed inconclusive. Following this, an attempt was made to lift a small area of the paper by using gellan gum[17] at 4% to soften the adhesion to the cover. This did not prove particularly effective, so the process was halted once the boundaries of the adhered fibres and text were visible, and this area was then photographed. The handwriting can be positively identified as that of Kafka's; however, very few complete words are visible. If a larger fragment of text does exist beneath the wrapper, it would surely be of interest to

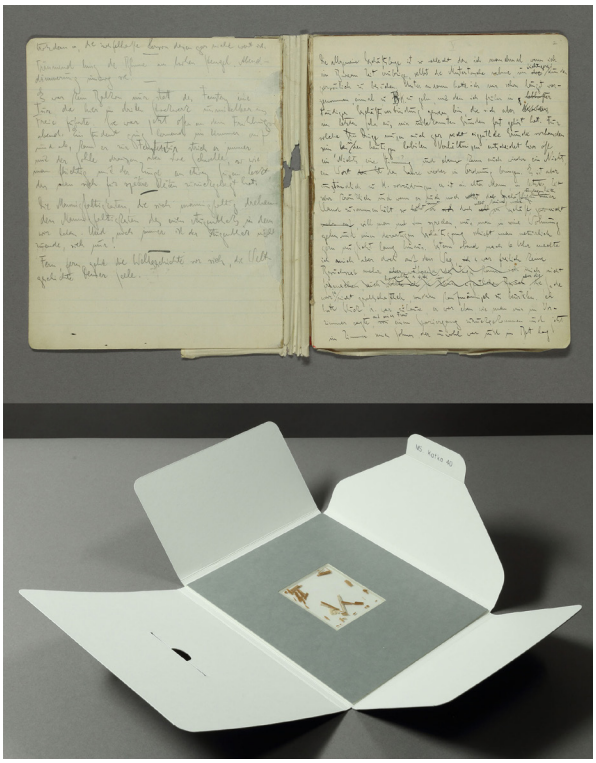

Fig. 7: MS. Kafka 40 after conservation. Upper: manuscript open to folios 1b and 2a, showing repair to Brod's paper wrapper. Lower: rehousing of adhesive and fibre fragments found at spine (Oxford, Bodleian Libraries, MS. Kafka 40).

17 Gellan Gum Kelcogel CG-LA, available from Gabi Kleindorfer https://gmw-shop.de/en/.

scholars; however, it was agreed that pursuing this possibility should not be at the expense of damaging Brod's later intervention which in itself provides historical evidence.

Several material elements of the notebook required addressing as they affected the handling and stability of the manuscript. A slack loop of sewing thread visible between fols. 1 and 2 was still securely attached within the structure, so was anchored with small paper tabs to the spine-folds in order to hold it in place. Small fragments of adhesive with attached fibres found loose at the spine could not be reintegrated and were instead encapsulated in Melinex® for storage with the manuscript (Fig. 7).

Brod's headed notepaper wrapper was excessively wide at the spine, meaning that this part of the wrapper had become creased and torn as well as making the manuscript unwieldy. However, preservation of all the material present was deemed vital, and any dramatic change in structure was not desirable. The damage to the paper wrapper was repaired in-situ using 2gsm Berlin tissue and 3.5gsm Tengu tissue[18] with wheat starch paste. During repair, care was taken to retain the concertina-type creasing in the spine area of the paper wrapper as otherwise the covers would not align when closed. Similarly, the protruding edges of the paper wrapper at head and tail were repaired whilst preserving their curled edges, as they would be more vulnerable to damage if fully flattened out. To assist with handling, a paper dust-jacket was made, which will help to control movement at the spine as well as protecting the projecting edges of Brod's wrapper.

Access to the manuscripts

As described in the introduction and hinted at in the title, this paper aims to explore the changing nature of Kafka's manuscripts as they transitioned from personal possession to research library collection. Subsequent to Kafka's ownership they gathered physical evidence of their residence in Tel Aviv; as has been shown, and in the three case studies discussed, it should be clear that conservation treatments to stabilize the manuscripts aimed to preserve all of this history without impingement. To return to the three values posited earlier – the "magical", "meaningful", and "material" – it seems reasonable to conclude that the conservation treatment of these three manuscripts did not impact upon the "meaningful" value, as all evidence of this nature has been preserved. As regards the "material" value, as with all conservation work, preserving all material aspects was a primary concern; whether in-situ or preservation and rehousing of elements that could not be reintegrated.

When it comes to the "magical" value, considered evaluation is needed in order to understand how these manuscripts now appear to the scholar or viewer who may encounter them as perhaps the impact of their library treatment weighs more heavily than anticipated in this area. Considering the three ways in which these manuscripts can now be accessed perhaps reveals a disjuncture between the "magical" qualities experienced by the conservators and curators of this collection and visitors to the Bodleian Library.

Digital consultation

In an endeavour to preserve the Kafka manuscripts, which due to their intrinsic qualities remain fragile even after conservation in many instances, the collection can be accessed only by Kafka scholars with a proven need to consult the physical objects. This results in perhaps two or three people a year viewing the actual manuscripts. A slightly larger number of visitors are directed to view the digital surrogates of the manuscripts, available on a single computer in the Rare Books and Manuscripts Reading Rooms.[19] Users of the digital surrogates

18 Available from https://www.preservationequipment.com/.

19 Current copyright associated with the digital images

are able to see and consider all meaningful evidence within the manuscripts, but without being able to hold the physical object perhaps have reduced sense of the "magical" and "material" values.

Physical consultation

Taking the three manuscripts described previously as examples, those scholars who are permitted full consultation with the physical objects will encounter very little impact on the aesthetic appearance of the manuscripts as the repairs undertaken were minimal and sympathetic (with the exception of "fisherizing"), and they will gain a more profound sense of the "magical" and "material" values than those viewing the digital surrogates. However, before they see the manuscript itself they will encounter various layers of housing and associated accoutrements: boxes, folders, archival wrappers, rehoused fragments, and handling notes, perhaps interfering with the perception of the manuscripts as a direct conduit to Kafka. All these trappings also create an absurd juxtaposition between Kafka and Brod's treatment of the notebooks (cutting, tearing, even burning[20]) and this level of fastidious housing. Additionally items such as the rehoused adhesive fragments seem somewhat anomalous when considered from the contemporary viewer's perspective: they tell us about 20th-century mass-production methods and materials rather than anything about Kafka or his writing processes.

Display

The final way in which the Library allows and curates access to the Kafka collection is via exhibition, both in the Weston Library in Oxford and occasionally as loans to international institutions, such as the Deutsches Literaturarchiv in Marbach.[21] Displaying the notebooks as static objects behind glass seems to be a denial of the original purpose of a literary manuscript: the viewer can only see one opening and cannot read any text beyond this. Again it may also sit uncomfortably with what we know about Kafka's attitude towards the physical objects that contained his draft writings. However, perhaps the benefits of display outweigh these concerns as it allows large numbers of people to experience the "magic" of seeing Kafka's own handwriting, and to gain some sense of the "meaningful" and "material" values of these notebooks.

All of these methods of access can add up to a sense of the Library presenting the manuscripts as hallowed objects and the associated fragments as sacred relics, vastly removed from their genesis in Kafka's hands and somewhat dissociated from their original purpose. However, to consider library and museum collections more widely, it becomes evident that it is unavoidable that an object's nature changes upon being accessioned to a collection. In fact, the character of these manuscripts changed long before that, upon the death of Kafka, although in Brod's hands they did for a time retain their purpose as working documents, gaining further marks, notations, amendments and repairs. Once they entered the Bodleian's collections they transcended their original function: but equally this is true of many of our special collections; for example, the Gutenberg Bible[22] is not used to celebrate a mass just as Handel's conducting score of the Messiah[23] is no longer used in concerts.[24]

means that the surrogates are limited to being accessed in this on-site location rather than more widely available online.

20 For evidence of Kafka burning his own manuscripts, see Stach, note 1, 542-543 and 597, note 12.

21 The Bodleian shares some Kafka manuscripts with this institution, as MSS. Kafka 49-50 were purchased jointly with the Deutsches Literaturarchiv in 2011. See online catalogue for further notes on ownership and acquisition: http://www.bodley.ox.ac.uk/dept/scwmss/wmss/online/modern/kafka/kafka.html [accessed 28.06.2019].

22 Oxford, Bodleian Library, Arch. B b.10 and Arch. B b.11.

23 Oxford, Bodleian Library, MS. Tenbury 346.

24 For further discussion of how "conservation objects" change and acquire new meanings and functions, see Muñoz Viñas, note 5, 160.

Conclusion

Our interventions act to preserve the Kafka manuscripts as library objects, not as the working notebooks Kafka and Brod knew them as. Inevitably they have become precious items, and therefore efforts to house and preserve them treat them as such. Boxes and folders are necessary to protect the manuscripts from various elements whilst they are in storage and during transport, but may also fulfil a further function as they suggest to the reader that extra care may be needed with this item. Anecdotally, there are indications that being presented with a well-boxed manuscript encourages more careful behaviour from readers. Additionally, the rehoused fragments that seem rather absurd are in fact consistent with how we rehouse and preserve all material that cannot be reintegrated, regardless of whether it is an endband from a 15th-century binding or a loose piece of thread from a Kafka notebook. No value judgment is cast upon items due to their age or whether they were handmade with expensive materials or mass-produced with common materials.

The journey from author's draft to select library holding leaves many marks upon the manuscripts – both literally and figuratively. Conservation and preservation measures attempt to have a minimum impact and strive to preserve the meaningful and material elements for future audiences. Inevitably there are compromises along the way, as we are forced to prioritise the survival of the material elements above the user's experience of the elusive "magical" value. It is worth remembering that often the Library staff (and conservators in particular) have the most fortunate experience of all, with extended handling time and privileged levels of access, and perhaps, therefore, the most significant portion of the "magical value.[25]

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Iva Gobić Vitolović, Sanja Serhatlić

CONSERVATION OF A *CHINE-COLLÉ* COLOUR ETCHING BY M. C. CRNČIĆ (c. 1910)

Resumen

Este artículo describe la intervención en un grabado en color *chine-collé* de M.C. Crnčić, circa 1910. El valor estético y la integridad estructural de la obra estaban comprometidos por suciedad, insectos, humedad y daños mecánicos por inadecuada manipulación y almacenamiento incorrecto. Tras los análisis físicos y químicos de los soportes y elementos sustentados, y habida cuenta de la delicadeza del *chine-collé* y del riesgo de delaminación de los soportes, se decide adoptar una posición cautelosa ante la aplicación de cualquier tratamiento acuoso. La intervención incluye tratamientos de eliminación de manchas con geles, lavado acuoso, desacidificación y blanqueo solar. Los objetivos propuestos con la intervención fueron logrados satisfactoriamente.

Key-words: *chine-collé* etching, discolouration, analysis, aqueous treatments, sun bleaching

Object description

The *chine-collé* colour etching *Pod zidom* (c.1910) by Menci Clement Crnčić (1865–1930), from the Mažuranić-Brlić-Ružić Memorial Library and Collection, is a composite-structure paper support, comprised of the image-bearing layer of thin hand-made paper (*chine*) adhered to the secondary support (plate paper) of heavier machine-made paper. Both papers are made from cellulose fibres and were bonded together by starch adhesive during the printing process. The *chine* measures 457 × 275 mm and the plate paper measures 584 × 386 mm. The image extends beyond the edges of the *chine* onto the margins of the plate paper on all four sides, c 1.5–2 mm, making the recognition of the *chine-collé* technique easier.

The etching with the motif of old Zagreb is coloured with à *la poupée* technique[1] and signed by the author in graphite pencil at the bottom right corner, under the sign *eau forte* (French word for etching).

Damage

The print was severely damaged by grime, insects, water, and poor handling and storage (Fig. 1). In addition to extensive surface and ingrained dirt on both recto and verso,

1 Different printing ink colours were applied directly to a metal plate using a ball-shaped wad of fabric and printed through just one run in the press.

nearly the whole top third of the print was significantly discoloured by an oil stain, and the bottom right corner by a water stain (tide line). The paper support became brittle due to acidity, which, in addition to mishandling, resulted in numerous areas of mechanical damage – tears, fraying and cracking, particularly around the margins and in the upper part of the print (a crack ran along almost the entire horizontal dimension). Silverfish (*Lepisma saccharina*) caused significant abrasion of the top layer of the paper support, on both margin and image, leading to several holes, and adding to the paper's fragility. Previous handling left remains of starch adhesive used to mount the work during framing as well as discolouration from repairs with self-adhesive tapes, all on the verso of the artefact.

Conservation treatment

The request of the owner and the goal of conservation treatment was to strengthen the weakened structure of the object, as well as to regain its visual coherence and improve its aesthetic value through the reduction of discolouration, stains, and acidity.

Due to the delicate nature of the *chine-collé* print, careful planning and a cautious approach were necessary to avoid treatments that might result in the separation of the two sheets forming the laminate paper support. A thorough physical and chemical analysis of both support and media was carried out in advance of any procedures. Chemical spot testing of extracted fragments revealed that both papers are made from cellulose fibres and do not contain lignin or rosin. Spot testing of the media indicated that all the inks used on this etching were stable in water, ethanol and aqueous solution of calcium hydroxide. PH tests by electronic pH meter showed that the pH value of the paper support was between 5.5 (plate paper) and 6.3 (*chine*). An Iodine Potassium Iodide Test indicated the presence of starch adhesive as a binder between both the two sheets of paper and on the verso of the print. The absorbency test (*Water Drop Test*) of the paper support revealed that the oil-stained area was not absorbent at all, while other areas were very highly absorbent.

In preparation for treatment, the print was marked slightly around the corners of the *chine* with a very soft pencil to help reposition it should delamination have occurred during treatment.

After dry cleaning of the surface, impurities from the verso and of the recto-margins by brushing and erasures using a *Wishab* white sponge and a *Magic Rub* eraser, the reduction of discolouration and stains was first approached with the use of gels and solvents. A water-ethanol mixture (1:1) was sprayed across the surface before the 5% gel of *Tylose MH300P* with ammonia (pH 8) was applied locally, on stained areas. Remaining gel residue and impurities were then carefully rinsed under running water. Aqueous procedures continued with the suction table, capillary and blotter washing, allowing greater control, during which there were no traces of delamination, but also no results. After these attempts at stain removal failed, it became clear that bleaching would be necessary. Sun bleaching was chosen as the most sensitive treatment method; it is least harmful to cellulose and simultaneously used for deacidification. The print was immersed in a bath of an alkaline solution of calcium hydroxide (initial pH 9) for 3.5 hours, covered with UV-light filter polyester film (against the exposure to the damaging UV spectrum). The duration of treatment was carefully monitored, with suction table at hand, ensuring that the integrity of the composite support structure was maintained. This treatment result was very effective, not only in removing the acidic product and oil stain, but also the tide line and general discolouration.

After rinsing and partial air-drying, the sheet was flattened using the "hard-soft sandwich" technique,[2] between hard mu-

2 A special method developed by Homburger and Korbel as a very gentle way to flatten heavily creased or sensi-

Fig. 1: Object before treatment
(photo by Iva Gobić Vitolović)

Fig. 2: Object after treatment
(photo by Iva Gobić Vitolović)

seum board and soft felt, to protect the delicate relief surface of an etching during the drying process.

Japanese paper and wheat starch paste were used to repair tears and reinforce creases. The areas of surface loss on recto damaged by silverfish were filled with microcellulose powder and 1.5% methylcellulose, mixed in a dry state and applied in several thin layers. For better visual integration, the powder was toasted in a pan, acquiring a range of tones through various degrees of heat exposure. To counteract acidification after toasting, the powder was rinsed in tap water before use. Losses to the media were infilled with watercolour, in a tiny dot pattern, over a release layer of methylcellulose.

An empirical understanding of the properties of the object combined with a careful, considered approach to the planning of treatment procedures were the keys to the success of this project, a collaboration between the State Archives in Rijeka (DARI) and the Croatian Conservation Institute (HRZ). This approach, although potentially risky for the attachment of the *chine* and plate paper, resulted in the successful removal of staining and discolouration, achieving the desired aesthetic and structural improvement of the object (Fig. 2).

tive paper objects (H. Homburger, B. Korbel, 'Architectural Drawings on Transparent Paper: Modifications of Conservation Treatments', *The Book and Paper Group Annual*, 18 (1999), 25-33).

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PRESERVATION OF LOJZE DOLINAR'S SKETCHES (ca. 1950–1970)

Zusammenfassung

Der Nachlass von Lojze Dolinar, einem Hauptrepräsentanten slowenischer Bildhauerkunst des 20. Jahrhunderts, umfasst auch Arbeiten auf Papier, deren Hauptmotiv die menschliche Figur ist. Dieser Beitrag befasst sich mit der kunsthistorischen Analyse der Artefakte, die allerdings durch den Zustand der Arbeiten nach Restaurierung in ein Dilemma gerät. Obgleich ein etabliertes Verfahren die Langzeitstabilität säurehaltiger Papiere verbessert, kann die Entsäuerung auch zu nachteiligen Effekten führen. Aus diesem Grund wurde eine Studie bezüglich der Farbveränderung an Testpapieren durchgeführt. Anhand dieser Testergebnisse wurden für 68 großformatige Zeichnungen Entscheidungen für eine Reihe von Konservierungsmaßnahmen erstellt.

Keywords: Lojze Dolinar, deacidification, works of art, paper, sketches, drawings

Introduction

In 2014, sixty-eight of Lojze Dolinar's sketches, stored at the Gorenjska Museum, were delivered for conservation-restoration to the National and University Library (NUL) Centre for Preservation and Conservation of Library Materials.

The sketches, produced by Dolinar in the 1950s and '60s were drawn on low-quality paper.

Starting in the mid-19th century, wood replaced rags as the raw material for paper manufacture. Wood is processed into paper by mechanical or chemical pulping, which produces paper with shorter fibres. Mechanical pulping produces ground wood pulp paper with the shortest fibre length and does not remove lignin from wood, which promotes acid hydrolysis, darkening, staining of nearby materials and deterioration. Lignin is a naturally occurring substance in wood that darkens and breaks down into acidic byproducts as it ages. In addition, wood pulp papers from before the 1980s tend to be acidic due to alum-rosin sizing, that can lead to brittleness and discolouration of the paper.[1] Ground wood pulp paper is acidic and rapidly becomes brittle. Such paper has a relatively short life expectancy and is used for newspapers, pulp novels, etc.[2]

1 Library of congress, The Deterioration and Preservation of Paper: Some Essential Facts https://www.loc.gov/preservation/care/deterioratebrochure.html [accessed 15 May 2019].

2 National park service, How to preserve acidic wood pulp paper, in: *Conserve O gram,* 19/24 (2001) <https://www.nps.gov/museum/publications/conserveogram/19-24.pdf> [accessed 15 May 2019].

In order to preserve information on wood pulp papers, rehousing in high quality materials as well as reformatting (microfilming or digitization) are advised. In addition, low temperature, relative humidity, and light will extend the life expectancy of the documents.

Conservation treatments, such as deacidification, can be performed on significant original documents, which must be kept due to their value. Deacidification is a process of treating paper documents to neutralize their acidic content, with the objective of prolonging the object's useful life.

Deacidification processes are either aqueous (using water) or non-aqueous (not using water). For deacidification purposes, most often weak bases, such as alkaline earth carbonates, hydroxides, or oxides, are used. Usually, calcium or magnesium carbonates are introduced into the paper in the form of hydrogencarbonates due to their higher solubility in water compared to the corresponding carbonates. The pH value of paper after deacidification is significant, as increased alkalinity might induce colour changes of the inks, pigments, and dyes.[3] The pH value of the paper in the range of 7.5 to 9 due to the presence of $CaCO_3$ has been regarded favourably by conservation scientists.[4]

The aim for conservators, librarians, and curators is to prevent any damage to objects of historical value undergoing deacidification treatments. If water-based procedures are not possible or appropriate, as in the case of documents containing water-sensitive inks or dyes, non-aqueous deacidification procedures have been developed.

Non-aqueous deacidification processes use solvents or gases to carry the alkaline buffering agent. They are well suited to treating books and other bound materials because the gas or solvent is able to penetrate deep into the crevices and close spaces of books and treat the material evenly. The Bookkeeper deacidification process,[5] which is available and applied worldwide, uses a dispersion of submicron particles of magnesium oxide in inert liquid. It is also available as a spray product to treat single items in paper conservation workshops.

However, deacidification sprays can cause some side effects on wood pulp paper. Problems, such as darkening of some wood pulp papers, colour changes of colour media and supports, staining on some types of papers and leathers, residue build-up on paper, cockling and buckling of some papers and running of some media, such as inks, pigments, and watercolours can occur after spraying of objects.[6]

Over the past two decades, nanotechnologies have been increasingly introduced for the deacidification of paper artefacts. Nano- and micron-sized calcium hydroxide particles in alcohol media were introduced by Giorgi et al.[7] as an effective agent for deacidification of library and archival material.

This paper focuses on the art-historical analysis of the artefacts and the dilemma of interfering with the condition of the works by using conservation treatments. A study of colour changes caused by various methods of deacidification has been carried out on mock-up papers. According to the results, the decision on the range of conservation treatments for 68 large format drawings has been made.

3 A. F. Clapp, *Curatorial care of works of art on paper: Basic procedures for paper preservation* (New York: Lyons and Burford, 1977), 26.

4 J.W. Baty, C.L. Maitland, W. Minter, M.A. Hubbe, S. K. Jordan-Mowery, 'Deacidification for the conservation and preservation of paper-based works: a review', in: *BioResources,* 5 (2010), 1955-2023.

5 Preservation technologies, Bookkeeper <https://ptlp.com/en/bookkeeper/overview/about-us/> [accessed 15 May 2019].

6 National park service; The Book and Paper Group of the American Institute for Conservation of Historic and Artistic Works, in: *Paper conservation catalog. Neutralization and alkalinization* (1985), 2; <http://cool.conservation-us.org/coolaic/sg/bpg/pcc> [Accessed 8 May 2019] G. Petherbridge, *Conservation of library and achive materials and the graphic arts* (London: The Institute of paper conservation and the Society of archivists, 1987).

7 R. Giorgi, L. Dei, M. Ceccato, C. Schettino, P. Baglioni, 'Nanotechnologies for Conservation of Cultural Heritage: Paper and Canvas Deacidification', in: Langmuir, 18 (2002), 8198-8203.

Sculptor Lojze Dolinar

Lojze Dolinar was born on 19 April 1893 in Ljubljana and died on 9 September 1970 in Ičići near Opatija. He is regarded as one of the leading representatives of Realism, Art Nouveau, Expressionism, New Objectivity, and Social Realism in 20th-century sculpture in Slovenia.[8]

Dolinar loved to draw. However, his drawing oeuvre is not preserved entirely. In 1944, the Germans occupied Dolinar's house in Belgrade and destroyed nearly all drafts for sculptures and other art material.

In 2000, when Dolinar's widow Branka Dolinar, née Jurić, passed away, the City of Kranj and the Museum of Gorenjska agreed that the latter would gain custody of Dolinar's artistic legacy located in his studio at Rotarjeva ulica 4 (some sculpture drafts, numerous drawings, photographs and other documentation, a specialized library, sculptural tools, furniture: a bookcase, drawer, drawing desk, etc.).

The majority of Dolinar's drawings, drafts and sketches kept in the Museum of Gorenjska in Kranj, probably originated in the 1950s and '60s. Unlike prints, they were never intended for presentation at exhibitions. While drawing or sketching, Dolinar could, therefore, use different types of paper, which was at hand, such as wrapping papers and small scraps of paper that were later glued to larger pieces of cardboard, or the backs of photographs. He would draw with pencils, ink, fountain pen and ballpoint pens of various colours. Many of these scraps of paper are damaged, yellowed and folded, with edges torn or trimmed. One can assume that Dolinar often began to form his ideas for sculpture by drawing them first. Works on paper offer valuable insight into the evolution of his sculpture ideas. Some of these drawings can be related to specific sculptural works (small sculptures), while some have been transformed into independent drawings and prints for the exhibition in 1958. Dolinar's basic motif is a human figure, usually connected to larger figure groups. The full sculptural impression of his figure motifs, in pencil drawing, in particular, was achieved by means of shading.

The vastness of Dolinar's oeuvre is extraordinary. The catalogue of his retrospective exhibition (Museum of Modern Art in Ljubljana, 1996)[9] lists 505 works of sculpture, and many a work from his Belgrade period was not included there. Dolinar's drawings and prints are discussed in a brief text in this catalogue.[10] The list of works also includes 33 prints and seven drawings or sculpture drafts, which is only a modest selection of the vast sculptor's legacy.

The catalogue of his memorial exhibition in the Town Hall in Kranj in 2017 also includes some of Dolinar's works on paper.[11]

Experimental:

Paper samples

The samples were produced for the needs of the project PaperTreat[12], with different compositions:

- PT1: bleached chemical pulp, 12.2% kaolin, initial pH value 4.8±0.2;
- PT2: 80% ground wood, 20% bleached chemical pulp, 11.7% kaolin, initial pH 4.8±0.2.

Samples were immersed into 0.01 $mol \cdot L^{-1}$ aqueous solution of calcium hydrogencarbonate (marked as $CaCO_3$) two times for 20 minutes or into various non-aqueous dispersions for two minutes and left to dry on Mylar film.

8 Biographical data from: F. Šijanec, *Sodobna slovenska likovna umetnost* (Maribor: Založba Obzorja, 1968), 292-302; Š. Čopič, *Lojze Dolinar* (Ljubljana: Partizanska knjiga, 1985); Š. Čopič et al., *Lojze Dolinar (1893–1970) / Retrospektivna razstava* <Ljubljana, Moderna galerija, 20. december 1996 – 12. februar 1997> (Ljubljana: Moderna galerija,1996).

9 Čopič, note 8.

10 B. Ilich Klančnik, 'Dolinar's drawing and printmaking', in: *Lojze Dolinar*, note 8, 39-40.

11 D. Globočnik, *Lojze Dolinar (1893–1970),* (Kranj: Gorenjski muzej, 2017).

12 European Community, Sixth Framework Energy, Environment and Sustainable Development Programme, Contract No. SSPI-006584 (PaperTreat).

A solution of calcium hydrogencarbonate was prepared using 1.5 g of calcium carbonate in 1 L of deionized water. Carbon dioxide gas was bubbled through the suspension of calcium carbonate and water until the solution became clear.

Non-aqueous dispersions were: CaLoSil IP5 (nano $Ca(OH)_2$ in 2-propanol, 3 $g \cdot L^{-1}$, marked as CS iPr, IBZ-Salzchemie GmbH & Co.KG, Halsbrücke, Germany), CaLoSil E5 (nano $Ca(OH)_2$ in ethanol, 5 $g \cdot L^{-1}$, marked as CS EtOH), Bookkeeper deacidification dispersion (MgO sub-micron sized particles with the addition of a surfactant- a perfluoropolyether derivative in perfluoro-alkane, marked as BK), Preservation technologies, Cranberry Township, United States).

Accelerated degradation

The treated and the untreated samples were subjected to accelerated degradation conditions in a Vötsch VC 0020 climatic chamber under the following conditions: 80°C and 65% RH for up to 12 weeks.

pH determinations:

Surface pH determinations on original documents were determined according to a Tappi 529 om-04 standard[13] using a flat combined electrode (Metrohm¸ 6.0256.100), connected to a Mettler Toledo MP 220 pH meter.

On paper samples, the pH of paper extract was performed according to the TAPPI T 509 om-02 standard,[14] adapted to lower quantities of the sample in the following way: to 100 mg of sample, 7 mL of deionized water was added. pH was determined in the water extract after one hour, using a flat membrane electrode (Metrohm 6.0256.100) connected to a Mettler Toledo MP 220 pH meter.

Colour measurements

The colour of the paper was determined using a Minolta CM-3610d diffuse reflectance UV-VIS spectrophotometer, with specular component excluded and a D65 standard illuminant. The instrument has a d/8° geometry, and reflectance was measured in percentage relative to a polymeric Minolta standard. The values for the colour are expressed in the CIE 1976 LAB system.

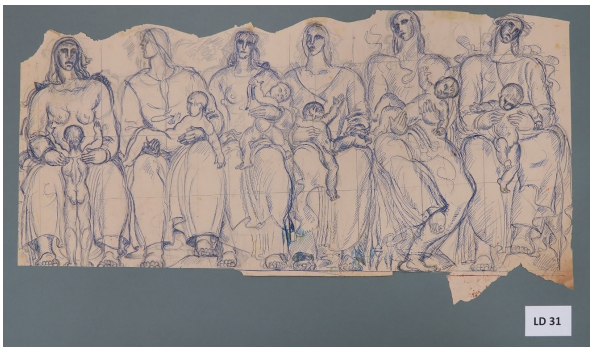

Fig. 1: Drawing (L. Dolinar, Gorenjska Museum, Kranj) with ballpoint pen with damage due to bleeding of the ink. (Photo: Milan Štupar, NUL)

Fig. 2: Damaged drawing (L. Dolinar, Gorenjska Museum, Kranj) with pencil on paper: folds, wrinkles, creases, tears, holes and losses to the paper, discolouration, clay tape, stains. (Photo: Milan Štupar, NUL)

Condition assessment of the sketches

All 68 sketches were drawn on machine-made, mostly low quality, lignin-containing paper with pencil (53 sketches), color pencils (1), ballpoint pen (2) or combination of pencil and ballpoint pen (8), combination of pencil and brush point pen (1), combination of pencil and colored pencil (2) and combination of pencil, colored pencil and

13 TAPPI 529 om-04. Surface pH measurement of paper. 2004.

14 TAPPI T 509 om-02. Hydrogen ion concentration (pH) of paper extracts (cold extraction method). 2002.

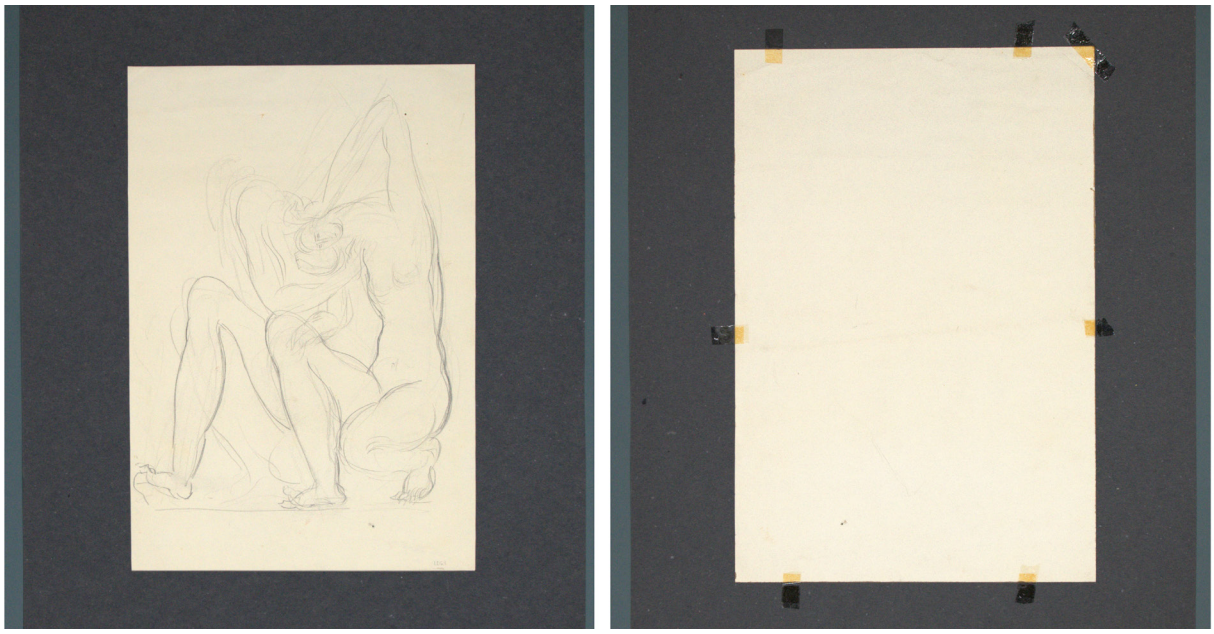

Fig. 3: Drawing with pencil on paper in mat (L. Dolinar, Gorenjska Museum, Kranj). Left: front side, right: back side (Photo: Milan Štupar, NUL)

ballpoint pen (1). The dimensions were very different; the smallest measured 29 × 33 cm, the biggest 85 × 100 cm, most of them had an irregular shape.

The condition of the colour layer was generally good; only slight bleeding of the ink could be observed on one of the sketches (Fig. 1). Due to the acid hydrolysis of paper, discolouration (66 sketches) and associated brittleness (38 sketches) were observed on most of the papers. Many sketches were stained due to foxing (25), adhesive stains (63), mostly with clay, colour stains; in one case water stains were evident and, there were rust stains on two of the sketches. All sketches were also mechanically damaged: the paper was either folded, creased, wrinkled or contained tears, holes or losses to the paper (Fig. 2).

Some of the sketches had remnants of self-adhesive tapes, mostly gummed tapes. Ten sketches were improperly mounted in *passe-partouts* using adhesive tapes and acidic materials (Fig. 3). In addition, storage materials (paper folders) were made of low-quality paper with an acidic pH value.

Determination of pH values on sketches and storage materials

On five sketches, measurements of pH values were performed. The pH values ranged from 4.3±0.2 to 5.1±0.2, proving the acidity of the papers. In addition, *passe-partouts* and paper folders were measured. Average pH values of paper folders were 6.4±0.1, and 5.8±0.4 of *passe-partouts*, all in acidic pH region.

pH values and colour stability of the paper samples after deacidification

One of the most important parameters for conservators are the colour changes in the paper after conservation procedures. Colour changes of the samples are undesirable if the change is large enough to a perceptible degree. The most frequent causes of perceptible colour changes are pH-induced changes, the introduction of coloured substances or substances that form coloured products after application or during artificial thermal ageing or deposits on the paper.[15]

15 B. Reissland, R. Van Gulik, A. de la Chapelle, 'Non-aqueous prototype treatment agents for iron-corroded papers:

To study the effect of deacidification treatment on the color stability of the paper after deacidification procedures or artificial degradation, two types of papers, one containing only bleached chemical pulp (PT1) and another containing ground wood pulp and bleached chemical pulp, were selected, treated and analysed (paper samples are marked with PT1 and PT2). The papers were deacidified with an aqueous solution of calcium hydrogencarbonate (marked as $CaCO_3$), Bookkeeper deacidification dispersion (BK) and CaLoSil suspensions of nano calcium hydroxide in either isopropanol (CS iPr) or ethanol (CS EtOH). At the time of conservation treatment, there was no commercially available dispersion containing nano-particles for the treatment of paper documents. In the study by Giorgi et al., it was shown that the application of nanoparticle dispersions of calcium hydroxide in a concentration of $10 g \cdot L^{-1}$ to ancient acidic paper samples from the 14th, 17th, 19th, and 20th centuries provided excellent results.[16] The product CaLoSiL treatment dispersion,[17] containing nanoparticles of calcium hydroxide, was developed for the conservation of stone, mortar, and plaster; therefore, it was necessary to test it before it could be used on paper documents. All treatment solutions resulted in pH values between 7.2 and 8.1±0.2, with the lowest pH values obtained after deacidification with calcium hydrogencarbonate. The resulting pH values were all below pH 9, considered optimal for the stabilization of paper documents.

The colour of the samples after deacidification treatment and after accelerated degradation was determined with a diffuse reflectance spectrophotometer. Different studies have proposed different ΔE^* values (total colour difference between two samples) that have a just noticeable difference, which is the difference perceived by the human eye. Usually, the colour difference (ΔE^*) that equals 1-1.5 is suggested.[18]

Fig. 4: Scanned images of paper samples before and after accelerated degradation for 12 weeks.

As evident from Figs. 4, 5, and 6, the colour of the paper changes after the conservation procedure (0 weeks of accelerated degradation) and even more after accelerated degradation. In both cases (PT 1 and PT2), the treatment with calcium hydrogencarbonate (sample $CaCO_3$) did not change the colour of the paper to a perceptible degree. The treatment with CS EtOH changed the colour of the paper samples to a perceptible degree ($\Delta E^* > 1.5$) on both papers. On lignin-containing sample PT 2, yellowing of the paper after application of the nano calcium hydroxide dispersions was stronger (Figs. 4 and 6) and could be noticed with the naked eye. The difference was even more noticeable after the test of spraying CaLoSil suspension on the paper, with yellow dots clearly visible on it. The results are similar to the ones obtained using an aqueous calcium hydroxide bath. The most serious drawback of the method is considered to be yellowing to lignin-containing paper, attributed to the high pH of the deacidification bath.[19].

After accelerated degradation, the biggest colour changes were observed on untreated papers and the smallest after treatment with calcium hydrogencarbonate solution. Bookkeeper deacidification dispersion, as well as CS EtOH, induced the biggest colour changes among deacidification

Evaluation of side effects', in: *Iron gall inks: on manufacture, characterisation, degradation, and stabilisation* (ed. by J. Kolar, M. Strlič, (Ljubljana: National and university library 2006), 215-246.

16 Giorgi, Dei, Ceccato, Schettino, Baglioni, note 7, 8198-8203.

17 IBZ-Salzchemie <https://ibz-freiberg.de/en/products> [accessed 15 May 2019].

18 IBZ-Salzchemie <https://ibz-freiberg.de/en/products> [accessed 15 May 2019]. c

19 poulou, 'Paper conservation methods: a literature review', in: *Cellulose*, 22 (2015), 2859-2897.

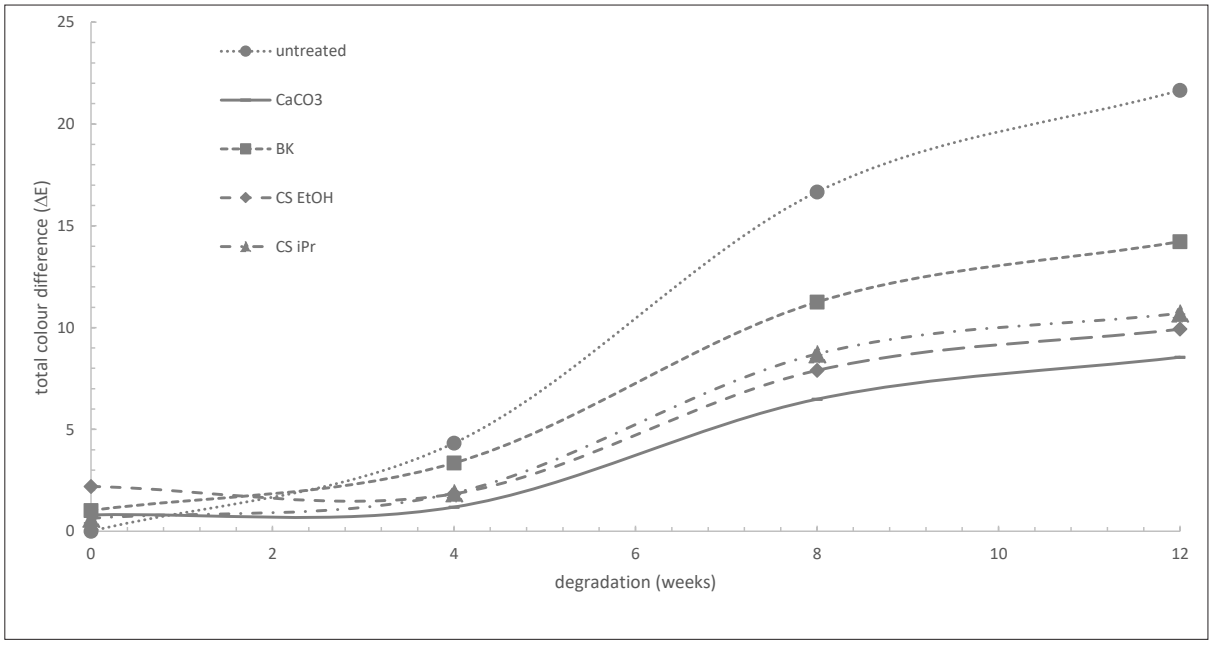

Fig. 5: Total colour difference of paper sample (PT1) after artificial thermal ageing. The average standard deviation of total colour difference determination was 0.4.

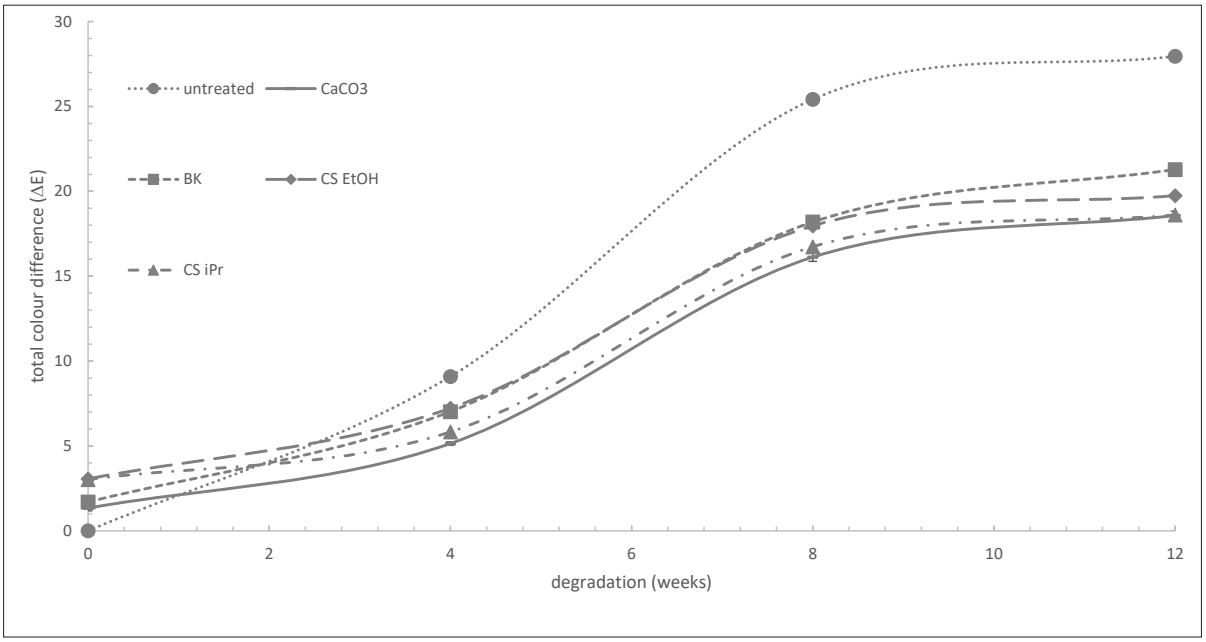

Fig. 6: Total colour difference of paper sample (PT2) after artificial thermal ageing

dispersions. The results are in accordance with literature data, as yellowing is usually attributed to the magnesium-containing deacidification agents, including Bookkeeper.[20]

The average standard deviation of total colour difference determination was 0.4.

Conservation treatment

The consensus is that which comprises the original work of art should not be modified in any way, and the superficial

20 D. S. Stauderman, I. Brückle, J. J. Bischoff, 'Observations on the Use of Bookkeeper Deacidification Spray for the Treatment of Individual Objects', in: *The Book and Paper Group Annual*, 15 (1996), < http://cool.conservation-us.org/coolaic/sg/bpg/annual/v15/bp15-17.html> [accessed 5 June 2019].

Fig. 7: Drawing (L. Dolinar, Gorenjska Museum, Kranj) before (left) and after (right) removal of passepartouts, self-adhesive tapes, deacidification and conservation of mechanical damage. (Photo: Milan Štupar, Petra Zaviršek, NUL)

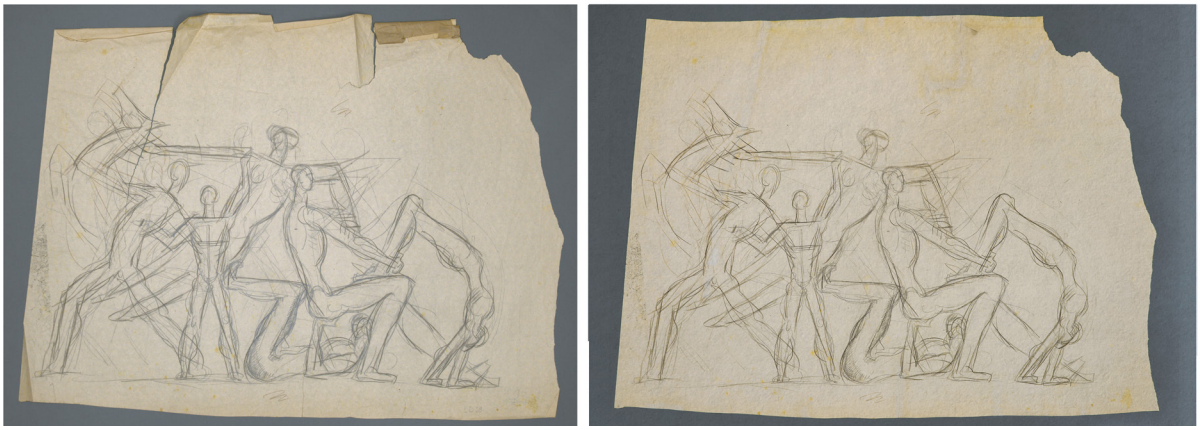

Fig. 8: Drawing (L. Dolinar, Gorenjska Museum, Kranj) before (left) and after (right) local conservation treatment. (Photo: Milan Štupar, Petra Zaviršek, NUL)

traces of natural ageing or even sometimes evidence of accident should not be suppressed. In contrast, means are sought to minimize insofar as possible other consequences of ageing, such as discolouration of paper that is evidence of chemical deterioration, whether from the poor preservation of the work or because of the quality of its support.[21]

The elimination of acidity and the introduction of protection against acidity into paper can be considered as preservative actions if the treatments do not affect the image and thus the pictorial equilibrium.[22]

Based on the results of the colour stability of the samples after the application of deacidification treatments, it was decided not to use CaLoSil dispersions or Bookkeeper deacidification spray, which could be sprayed on the verso of the drawing in order to avoid white deposits of magnesium oxide on the sketches. Treatment that suppressed ageing and therefore discolouration of the paper carrier was primarily the aqueous one with calcium hydrogencarbonate solution. In addition, the treatment did not cause significant colour changes directly after deacidification treatment.

Because it is most effective if applied on the paper as water bath, it could be used only without any water-sensitive media present. Therefore, solubility tests for all

21 C. James, 'Concerns of the curator and concerns of the conservator', in: *Old master prints and drawings. A guide to preservation and conservation*, ed. by M. B. Cohn (Amsterdam: Amsterdam University Press, 1997), 200.

22 James, note 21, 202.

present media were performed to obtain an indication of the risk of media by dissolving (bleeding) in water. Only those with stable media and not the biggest format sketches (altogether 29), which could be safely handled and supported in their wet state were deacidified.

On all drawings, dry cleaning was performed using Staedtler Mars plastic erasers, Wishab sponges, and scalpels for removing self-adhesive tapes.

Self-adhesive tapes were removed on 39 drawings. If present, gummed tapes were removed by using hot water and scalpel. The rest of the tapes were removed mechanically, using scalpel and eraser or a mixture of acetone and ethanol in a 1:1 volume ratio.

On drawings selected for deacidification, dry and wet cleaning in warm water was performed prior to deacidification. Wet cleaning was performed on nylon screens to prevent them from creasing and tearing during handling. They were subsequently deacidified by immersion (two times for 20 minutes) in 0.01 $mol \cdot L^{-1}$ calcium hydrogencarbonate solution. Tears were mended while the drawings were still moist using Japanese paper (Japico, Tosa Tengujo, 7,3 $g \cdot m^{-2}$, Japico, Kozu – Shi natur, 23 $g \cdot m^{-2}$). Afterwards, the sketches were left to dry slowly under pressure.

Mechanical damage was repaired using Japanese paper (Japico, Tosa Tengujo, 7,3 $g \cdot m^{2}$, Japico, Kozu – Shi natur, 23 $g \cdot m^{-2}$ and wheat starch paste made with fine wheat starch and solution of calcium hydrogencarbonate. Folds and creases were (if not deacidified) locally moistened and dried under weight.

Passe-partouts were also removed from the collection, as they were of acidic board and drawings fixed inappropriately with self-adhesive tapes.

In order to preserve the drawings in their new condition for as long as possible, folders were made of museum quality paper with alkaline buffer according to ISO 18916 (Klug K017120 100 $g \cdot m^{-2}$). The largest drawings, too big to be stored in the museum's drawers, were put between paper sheets and rolled.

Conclusion

Before the memorial exhibition, which was held in 2017 in the Town Hall in Kranj, some of Dolinar's drawings were conserved.

As the analysis of the effect of ageing on the pictorial equilibrium is fundamental since all further potential conservation treatment depends on it, deacidification treatments were tested on mock-up papers of similar quality.

All sketches were cleaned, self-adhesive tapes were removed, and mechanical damages were repaired in order to prevent further damage during handling, storage and display, and to improve the aesthetic effect of the artwork as well. Some of the sketches were chemically stabilized. The rest will have to be treated by additional deacidification procedures, safe to be used by conservators on each specific case that has to be developed yet. In order to improve storage conditions of the artworks and preserve them for our successors, old, improper protective equipment was replaced by high quality paper enclosures.

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RESCUING *THE WOMAN IN WHITE* BY GABRIJEL STUPICA

Zusammenfassung

Der Modernismus des 20ten Jahrhunderts und die fortgesetzte Tradition des 21ten Jahrhunderts in einer Zeit des immer schnelleren technologischen Fortschritts haben Veränderungen in einer Art und Weise zur Folge, wo alles möglich erscheint bezogen auf die genutzten Materialtechnologien innerhalb des Feldes der modernen Bilder. Die "Frau in Weiß" ist ein Bild von Gabrijel Stupica, das Teil seiner Reihe „die Bräute" ist. Es wurde in der Tempera Papiertechnik um 1975 erstellt. Die Farboberfläche ist bröckelig und blättert ab, der Träger ist empfindlich gegenüber Feuchteeintrag sowie faltig und an bestimmten Stellen abgerissen. Wenn der Künstler gegen die etablierten Regeln oder Standards der Kunsttechnologien ist, dann müssen diese Prozeduren auch vom Restaurator akzeptiert werden und er muss das Kunstwerk in einem professionellen und angemessenen Weg restaurieren.

Key words: Stupica, Tempera, Bild, Transparentpapier

Introduction

At the start of 2019, the Book and Paper Conservation Centre of the Archives of the Republic of Slovenia in collaboration with the Moderna galerija/Museum of Modern Art in Ljubljana restored a severely damaged painting by Gabrijel Stupica, titled *Žena v belem/Woman in White* (97 × 62 cm). Owned by a private collector, the painting is one of the sketches Stupica made for his series *Neveste/The Brides*, around 1975, using tempera on tracing paper. The painting is double-sided; on recto there is an image of a woman, and on verso, a drawing in pencil (Fig. 1).

Outline of the problem

In modern art, the material most often conveys the artistic idea and is, as such, technologically interesting, making preservation of the material structure an essential element that complements the whole.

Stupica's work of art is a typical open work – the artistic technology co-defines the significance of the artwork, posing the question of how the artist was even able to achieve a certain complex visual effect, optical impression, technological perfection, material play, or figurative composition. Stupica followed his unique inner creative purpose and managed to accomplish it to a

Fig. 1: Painting before conservation treatment

certain degree. The painting discussed here shows no visible stages of development: what we see is the final image condensing the painter's intentions.

The drawing/sketch "moves" over the tracing paper, which is used as the support and which exposes various time sections in the creative process. By doing so, it offers us an insight into a particular stage of the creative process and in what follows that stage, when the artist paints over surfaces already painted on, enriching them with a brushstroke, leaving unpainted areas (the bouquet is not painted or collaged), disintegrating them in various ways and overpainting them, all of which indicates his artistic idiom.

Inappropriate past storage has led to considerable damage to the paper support, leaving it torn, warped, and wrinkled. The stiffness and mechanical sensitivity of the paper support is also the reason for its numerous cracks, wrinkles and fold marks, long tears, and missing parts. Due to complex mechanical and chemical damage, the conservation treatment was challenging and made further complicated by poorly preserved layers of degradable paint.

To achieve translucence in paper, fibres in cellulose pulp are mechanically disintegrated (defibrillated), or the pulp is chemically treated. Tracing paper made by disintegrating fibres is mechanically more durable than that produced with chemical treatment, since the latter accelerates the degradation of cellulose fibres and makes paper more fragile and brittle.[1] Tracing paper has many subtypes that all share a sensitivity to humidity, especially water, which causes permanent deformation – warping.[2]

Flattening warped surfaces and repairing tears and missing parts are the most challenging processes of conserving and restoring tracing paper, because they require humidity, which, however, has to be minimal to prevent additional warping. The diversity of tracing papers makes their restoration quite complex, which is why we always conduct preliminary testing of the support to establish the behaviour and compatibility of the materials that are to be used in the conservation treatment to strengthen the support and to replace its missing parts. In our case, Japanese paper was used for repairing the

1 C. Laroque, 'Transparent papers: a technological outline and conservation review', in: *IIC Reviews in conservation*, (2000), 21-31.

2 V. Flamm, C. Hofmann, S. Dobrusskin et al., 'Conservation of tracing papers', in: *ICOM-CC (* 9th triennial meeting, preprints, Dresden 1990: ICOM committee, 1990, Los Angeles 1990), vol. 2, 463-467.

tears and filling in the missing areas on account of its semi-translucence and strength.

Assessing the condition of *The Woman in White*

The examination of the painting before the restoration treatment revealed that analyses of the binder and the paint layers were required due to the complex painting technology and the poor condition of the painting. We decided to take four samples; two from the front (black and white paint layers) and two from the back (white and yellow stains). The samples were analysed using gas chromatography coupled with mass spectrometry (GC-MS), FTIR and Raman spectroscopy (RS). Based on the obtained FTIR spectra, two pigments were identified: carbon black and zinc white. The analysis of the binder with RS showed the presence of oil and a protein component, which indicates the usage of tempera with the addition of oil. Additionally, GC-MS analysis of the fatty acid composition of the binder showed the presence of linseed oil and egg. The results of the analyses conducted on the samples confirmed our hypothesis about the materials used and helped us decide which materials to use during the conservation procedure to strengthen the paper support and replace the missing parts (Fig. 2).

Fig. 2: Sampling of the detached paint layers

Working procedures

Having completed our examination, we established that the painting was not a complete whole, either from the aesthetic or from the technological points of view. In our case, the traditional method of saving this artwork was the most suitable one. Using a soft brush, we cleaned both sides of our object carefully so as not to cause any additional damage. We deliberately left all the stains and paint layers created by the artist or occurring later on, as they are part of the work's history. The next step was flattening the numerous wrinkles and fold marks, which was our biggest challenge in restoring the artwork. Damage of this kind is usually repaired by first humidifying wrinkles and then flattening them. Tracing paper, however, is quite sensitive to humidity and, when coming in touch with it, tends to react by developing permanent deformations (warping). The wrinkles in our painting were carefully humidified bit by bit, using a highly absorbent Kanebo® sponge, which helped control the amount of humidity used. The humidified parts were then flattened under weights. In paper conservation, Japanese paper with long and firm fibres is used. Due to the nature of the damage in our object (very long tears) we used Japanese paper in which fibres run in one direction only. Strips of Japanese paper were placed perpendicularly on a tear, thus "suturing" it. In places where the tears were pasted together, the support was flattened due to local intervention (being left under weights). Although this suggested a possibility for saving (flattening) the entire paper support, such a procedure would be highly risky due to the fragility of the paint layers (attempting to flatten the whole painting by leaving it under weights could lead to additional flaking of paint layers), which is why we decided against flattening the entire painting. The aesthetic aspect of the strip-pasted tears on the artwork is questionable at present, since only the pasted sections are now flattened, while the surrounding areas are quite warped. The support received the first shock when the layer of tempera (containing water) was originally

Fig. 3: Painting after conservation treatment

applied, causing the paper to warp. Through the years, the material became fragile and inappropriate storage only caused its further deterioration.

When adding the missing parts, we consistently followed the principle of minimum intervention and added Japanese paper in such a way as to preserve the original shape of the artwork; the painting is roughly in the shape of a trapeze, and its edges are not straight.

Retouching was done using QoR Watercolor combined with Aquazol® 50, which is a stable system against light-induced ageing (e.g., colour changes), forms a strong and flexible paint film, and has a low health hazard. With these materials, we achieve visual match of the added materials with original ones. In the agreement with results of FTIR analyses, the following pigments were used: carbon black, zinc and titan white (Kremer). This selection of colour technique enables us to produce the desired aesthetic effect. By using watercolours and matching the brushstroke to the original, we managed to approximate the original chromatically and in terms of texture (Fig. 3).

Conclusion

Most of all, however, conservators were challenged to clearly identify and grasp the inner rhythm of Stupica's creative mood and orientation, and recognize the technical and subject clues, which are neither causal nor rational, but instead follow the innovative whims of the artist's thought. Perhaps nowadays conservators are turning into modern analysts of artistic procedure in order to be able to "reproduce" in restoration creative techniques that are quite singular and particular only to the painter who produced the painting in a way not to copy or duplicate any already established procedures. Whenever an artist breaks conventional rules and standards of artistic techniques, a conservator also needs to accept such an approach in order to expertly save a damaged work of art.

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Liza Lampič

DILEMMAS IN THE CONSERVATION-RESTORATION TREATMENT OF CONTEMPORARY ART PIECES MADE OF PAPER

Zusammenfassung

Die ideellen und materiellen Veränderungen in der Herstellung von Kunstwerken, die während des 20. Jahrhunderts stattgefunden haben, konfrontieren Restauratoren die sich der Aufgabe stellen, zeitgenössische Kunst zu konserviren mit neuen Herausforderungen. Unbeständigkeiten in der Stabilität neuer und unkonventioneller Materialien, in Kombination mit dem häufig essentiellen konzeptionellen Wert der verwendeten Materialien, führen manchmal in dem Versuch, sowohl materielle als auch ideelle Aspekte zu erhalten, zu unangenehmen Kompromissen. Dieser Artikel diskutiert dieses Dilemma am Fallbeispiel zweier Kunstwerke, die kürzlich in der Abteilung für Restaurierungdes Museums für Moderne Kunst in Ljubljana bearbeitet wurden: ein 'ready-made' Kunstwerk, 'Objekt iz kartona za jajca' (Objekt aus Eierkartons, 1967) von Milenko Matanovič, und 'Verbo Voco Visual' (1980), ein Kunstbuch des Westeast Kollektivs.

Keywords: Conservation-restoration, contemporary art, Milenko Matanovič, Westeast Ethics

Introduction

A break from traditional ways of artistic expression that occurred in the 20th century has brought about changes in the selection of materials used in artistic creation. The incorporation of unorthodox materials into artworks has become commonplace and, in fact, the material itself is sometimes the element in which the most significant role of expression lies. Previously unused materials and the combination thereof with more traditional ways of creation result in artefacts whose stability is unpredictable.

By focusing on two artworks made of paper created in the previous century that we recently treated at the Conservation Department of the Museum of Modern Art in Ljubljana, I will attempt to illustrate the dilemmas conservators of contemporary art are sometimes confronted with, and I will explore different approaches to conserving artworks composed of unconventional materials and the importance of considering the ideological aspects of their materiality, while striving to preserve a contemporary art piece in its most meaningful form.

Milenko Matanovič, *Object Made of Egg Cartons (Objekt iz kartona za jajca)*

Milenko Matanovič was a member of the artistic group OHO, which was active between

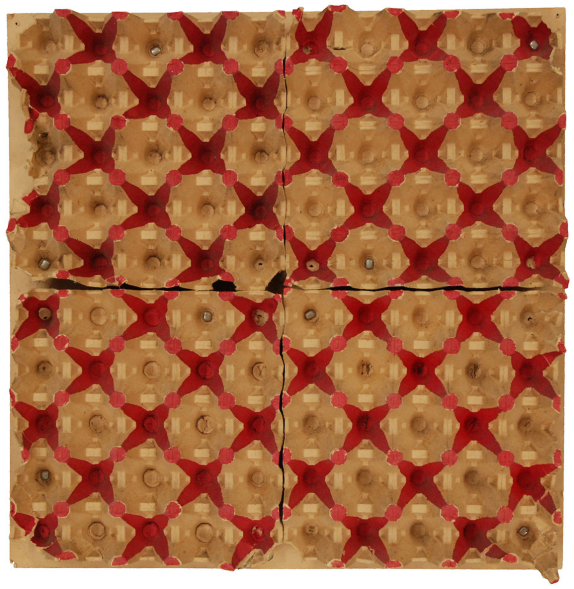

Fig. 1: Milenko Matanovič's *Object Made of Egg Cartons* before conservation

1966 and 1971. The group has been referred to by one of its members as a "constellation",[1] indicating the fluid nature of collaborations, as well as its artistic agenda. It combined visual, literary and film artists with theorists, who joined to create pop articles, happenings, installations, and works of art of a similar nature, merging art with everyday life.[2] In March of 2018, Milenko Matanovič was preparing an exhibition at the Museum of Contemporary Art Metelkova in Ljubljana,[3] with the goal of displaying art pieces that he had created during his time in the OHO collective, as well as later on as an independent artist and a member of different collectives, along with artwork created for the exhibition specifically.

One of the earlier works exhibited was a ready-made object called *Object Made of Egg Cartons*, created in 1967 (Fig. 1). In an interview about his work, Matanovič explained: "I had a special fondness for egg cartons. I liked their shape and felt that it

Fig. 2: *Object Made of Egg Cartons*. The paper pulp was crushed and missing mostly along the edges of the object

was a shame to throw them away after use. So I did a series of objects painting them in a variety of combinations, highlighting their geometry." [4]

The object is composed of four square egg cartons (holding 25 eggs each), that the artist mounted side by side on a piece of cardboard using metal pegs and painted certain parts in a magenta hue, creating a distinctive geometrical pattern.

It had been stored in the museum's repository but suffered significant damage in the years since its creation. Along with being very soiled, the fragile paper pulp was crushed and broken in several areas (Fig. 2). Especially at the edges, parts of it had detached and were stored alongside the artwork, while some of them were missing. Someone had already attempted to mend the damaged edge using white adhesive tape. Also visible was the abrasion of the pink paint, especially in the protruding areas.

Milenko Matanovič was highly involved in the installation of his upcoming exhibition, so we were very fortunate to have the artist essentially in-house at the time the conservation and restoration of the object were to take place. We were able to meet with the artist and discuss the possible solutions to the preservation and presentation of the object, which resulted in the agreement to attempt to restore *Object Made of Egg Cartons*.

1 K. Gurshtein, 'The OHO Files: Afterword', *ARTMargins*, 2011 <https://artmargins.com/the-oho-files-afterword/> [accessed 15 June 2019].

2 'Towards Zero Gravity' <http://zerogravity.mg-lj.si/slo/kozmiki/ohobio.htm> [accessed 15 June 2019].

3 Exhibition *Waves: 50 years of Milenko Matanovč Art*, Museum of Contemporary Art Metelkova, Ljubljana, March 29th – June 24th 2018.

4 B. Žerovc, 'The OHO Files: Interview with Milenko Matanovič', in: *ARTMargins*, 2011 <https://artmargins.com/the-oho-files-interview-with-milenko-matanovi/> [accessed 15 June 2019].

After thorough documentation, the object was cleaned using dry cleaning methods. The paper was consolidated where necessary, focusing on areas that were mostly hidden from view in order to avoid any risk of hue changes to the paper pulp. Areas where the paper was ripped were reinforced using starch paste and small pieces of thin Japanese paper. The same method was used to reattach the pieces that had fallen off. Reconstruction of the missing areas proved to be the most challenging part of this restoration process. In 1967, the artist used what was at hand at the time – he was inspired by egg cartons, as they were produced somewhere in the former Yugoslavia in 1967. At first glance, egg cartons like this are still in use to this day, but it comes as no surprise that they are not exactly the same as they were more than 50 years ago. The slight differences between the egg cartons produced and used in our vicinity presently, and those available in 1967 present themselves mostly in the hue of the paper pulp and the shape of the protruding areas that would have been between the eggs. Replacing the missing areas of Matanovič's egg cartons with any that would only approximately resemble the shape and hue of the original, would unduly expose the added parts to the viewer's eye, disturb the geometrical nature of the object, and thus render the reconstruction unacceptable. The specifics of the shape and texture of the material would also make its replacement with any of the materials more commonly used in paper conservation difficult.

What seemed like the best option was to alter a new neutral coloured egg carton to a more appropriate shape and colour. Pieces of a white egg carton were painted using diluted watercolour, which softened the paper pulp, making it more malleable while tinting it appropriately at the same time. After reshaping, any excess material was cut away, and the prepared pieces were left to dry in their new form. They were then attached in the same manner the previously detached original pieces were – using starch paste and Japanese paper. Most of the reattached and mended areas were situated at the edges of the object, making the white Japanese paper used in the process quite distracting, especially given the way the artwork was intended to be displayed (that is, vertically on the wall, exposing all sides except the bottom). The added Japanese paper was retouched using watercolour. Areas painted pink were easily reconstructed on parts of the carton that had been added, given the geometric nature of the painted pattern (Fig. 3). Small scratches in the pink paint were also retouched where deemed necessary. For this, a mixture of rice starch and dry pigments was chosen due to the density and stiffness of the mixed paint that prevented it from bleeding into the highly porous material, enabling it to remain on top and dry precisely where it was placed.

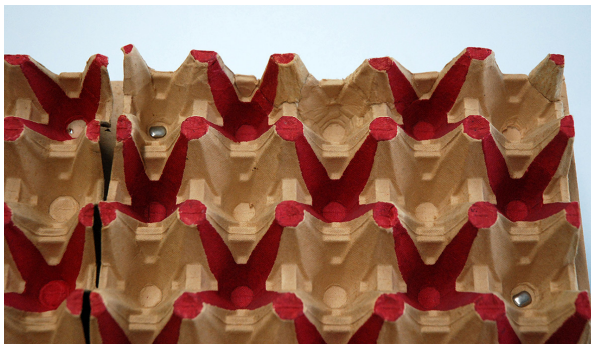

Fig. 3: *Object Made of Egg Cartons*. The damaged area after reconstruction

The object was displayed using pre-existing holes in the cardboard base of the object that had been reinforced using Japanese paper.

The conservation-restoration of the object resulted in the preservation of its material form and the idea of emphasizing the geometrical nature of the shape of an egg carton through the reconstruction of some missing areas that were detrimental to its expressional value.

Verbo Voco Visual, Westeast

The second art piece that shall now be discussed is an art book. The journal *Verbo*

Voco Visual was created by a collective of artists called Westeast in 1980. Formed in 1978 by Franci Zagoričnik, Westeast was defined by its founder as an avant-garde international artistic association,[5] an artistic and organizational endeavour.[6] Zagoričnik, a poet, essayist and translator as well as a former member of OHO, focused on creating visual poetry, which consequently reflected heavily in the work of Westeast.

The collective was responsible for the publication of ten art books, each of which focused on a different theme.[7] These books were works of mail art. The system implemented was as follows: after determining the theme of the journal, a call for artworks was sent to artists all over Europe by Franci Zagoričnik, who would act as editor to the miscellanies. Several artists would produce an artwork limited by a particular format (usually this was a standard A4 page),[8] multiply it a certain number of times (most commonly producing between 200 and 350 copies)[9] and send those back to the editor. Zagoričnik and other members of the collective would then bind these miscellanies and then send a copy back to each of the contributing artists. Some of the books were produced as hand-made journals or catalogues, while others were published as part of different magazines and periodicals, such as *Dialogi* in Maribor, *Pitanja* in Zagreb and *Delo* in Belgrade.[10]

In the politically divided Europe of the 1970s and '80s, this was a way of exchanging ideas and ideologically bridging geographical and political divides between the West and the East, as the name of the collective

Fig. 4: Both copies of the Westeast *Verbo Voco Visual* art books that are in the collection of the Museum of Modern Art in Ljubljana; copy no. 146 on the left and no. 28 on the right

Westeast implied. This gave the project a socio-political dimension along with an aesthetic one.[11]

The object of this discussion will be a copy of the fourth of the Westeast books entitled *Verbo Voco Visual*, copy number 146 of 300 copies. The Museum of Modern Art owns two copies of this particular miscellany: number 28 and 146 (Fig. 4). There are slight differences in the contributions they contain, limited to the colours of pens used or the placement of added elements, for example. There is, however, an evident difference in the condition of the two copies. These stem solely from their being kept in different environments for a number of years. As soon as we open copy number 146, we can plainly see that what caused the book the most harm was excessive moisture. Significant traces of mould are visible on many of the pages, especially those close to the covers (Fig. 5), which could be explained by a greater amount of what was most likely an organic adhesive used in the binding process. Traces of moulds can, in fact, be seen wherever this type of adhesive was likely used.[12] Pages of paper are warped

5 F. Zagoričnik: 'Podobe Besed' <https://mgml.si/sl/bezigrajska-galerija-1/razstave/24/franci-zagoricnik-podobe-besed/> [accessed 15 June 2019].

6 N. Marković, 'LJ : knjiga umetnika' (unpublished thesis, University of Ljubljana, Faculty of Education, 2012) <https://repozitorij.uni-lj.si/IzpisGradiva.php?id=26683&lang=eng&prip=rung:9127222:d5> [accessed 15 June 2019], p. 38.

7 Marković, note 6, 38.

8 Marković, note 6, 39.

9 'Projekt Westeast Se Ozira Nazaj - RTVSLO.Si' <https://www.rtvslo.si/kultura/razstave/projekt-westeast-se-ozira-nazaj/142801> [accessed 15 June 2019].

10 Marković, note 6, 40.

11 Marković, note 6, 40.

12 The affected pages were examined using a digital microscope and ultraviolet illumination. The latter showed several different colours of fluorescence, indicating the presence of several species of mould, or their traces. Multiple microscopic examination in the time span of several weeks suggested no recent growth of the mould, but no expert testing was done to determine the species or activity of the organism.

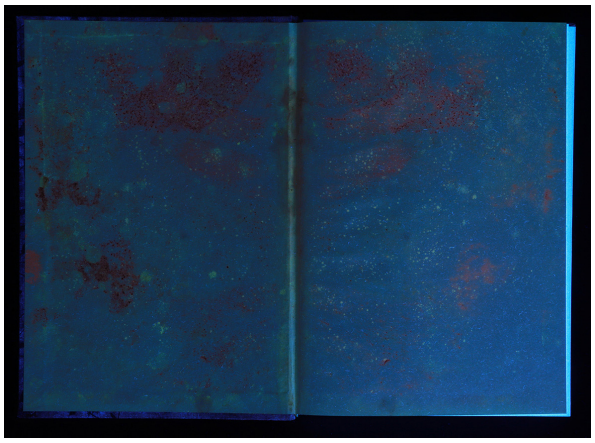

Fig. 5: *Verbo Voco Visual*. Different species of moulds seen under UV illumination

Fig. 6: *Verbo Voco Visual*. A contribution to the art book containing a pencil adhered to the page, causing paper deformation that was accentuated by elevated moisture

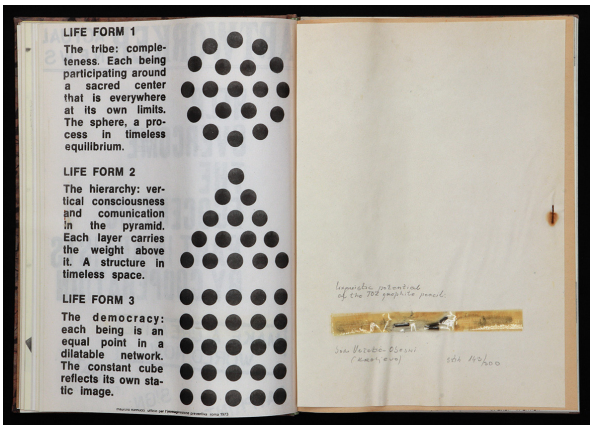

Fig. 7: *Verbo Voco Visual*. Degraded adhesive tape adhering pieces of graphite to one of the pages

throughout the book, which is partially due to the artistic contributions it contains, a pencil glued to one of the pages, for example (Fig. 6). If we compare it to the other copy of the book in the museum's collection (copy number 28), we can see that moisture greatly accentuated these deformations.

Damage due to elevated humidity is perhaps most dramatically seen in contributions that contain metal elements, such as nails and staples, some of which rusted considerably and left dramatic marks and stains on several pages surrounding the metal-containing contributions. In certain instances, rust corroded the support material, etching holes into the paper. Some interesting problems to which moisture was a contributing factor but not the only one responsible for decay included a folio containing several pieces of graphite that were taped to the page using transparent self-adhesive tape (Fig. 7). The adhesive properties of the tape had failed, detaching from the page along with the pieces of graphite, while the glue itself darkened visibly.

When this piece came to the conservation studio, a discussion arose about the most suitable approach we should take to preserve this art book in its most meaningful form.[13] The fact is that the majority of the changes that had occurred in and on the book were simply irreversible. The mould and rust stains were not easily removable and most likely impossible to erase. The wide variety of authors and concepts contained in each of the miscellanies suggest a great abundance of different materials, ranging from papers of different types, thicknesses, and finishes to different inks, pens and pencils, not to mention a variety of unorthodox added elements, some of which have already been mentioned. The differences in these materials also imply their various reactions to moisture, solvents and other factors, prohibiting the use of any of them in fear of causing harm to or accelerating the decay of one containing element or another. Considering these facts, an attempt at removing or lessening the rust

13 Numerous discussions with Nada Madžarac, MA (Museum of Modern Art Ljubljana) and a conversation with Prof. Jedert Vodopivec Tomažič (Archives of the Republic of Slovenia) on January 23rd 2019.

and mould caused stains, would mean unbinding the glue-bound book. Given the uncertain results of such an attempt, the downsides far outweigh its benefits. The fact that the art book in question is one copy out of 300 is also something to consider. The reasoning behind any restoration procedure would be of an exclusively aesthetic nature and in this case and so more detrimental than beneficial. It would perhaps also be morally questionable, considering the spirit in which the contributions in these journals were created: not as precious one-of-a-kind objects, but something that would convey an idea the artist wanted to express and something that could be easily reproduced, without this idea being lost in the process.

These considerations all contributed to deciding on non-invasive conservation in an attempt to best preserve *Verbo Voco Visual*. Further damage would be prevented through appropriate storage, rather than through more invasive procedures.

Conservation processes are currently ongoing. Following the initial inspection and documentation, the journal was cleaned. Dry cleaning methods were employed, using soft bristle brushes, focusing on pages that had visible mould remnants present. In the future, added elements that had detached from the pages will be reattached. Those include a stamp that had detached from the page, for example, as well as the previously mentioned piece of adhesive tape with pieces of graphite. Its side edges will be adhered back to the page, ensuring it does not become lost during any handling of the journal. Very thin pieces of acid-free paper that will not significantly affect the thickness of the book will be placed next to more problematic pages in order to provide an additional barrier between those folios and the rest. A protective case will be made from archival materials. Most importantly, proper storage conditions will have to be maintained, and the book must be inspected on a regular basis. While the traces of mould and metal corrosion that have already occurred will remain visible, following these precautions should ensure there is no further mould growth or additional rusting of the metal elements.

Conclusion

We can see by studying only two objects created in the last century – geographically and ideologically not very far from each other – that there are vast differences in how an object can and should be treated. Considering the diversity of approaches, methods and results in creating artwork in this era, perhaps that comes as no surprise. With artists moving away from all pre-set rules in art, conservators who work with these objects must also readjust their standards of what contemporary conservation should be. An artistic object's materiality often contains different meanings in contemporary art; not solely as its physical component, but an expressive element crucial to its communication with its audience. In his article on bespoke ethics in the conservation of contemporary art, Glenn Wharton emphasises the importance of judging "the different values that are at stake in the work and their relative importance".[14] Conservation solutions that have thus far been discussed in this contribution hopefully illustrate the compromises inherent in favouring one value of one artwork over another – the conceptual over the documentation value of an object or the latter over an aesthetic one. What the approaches chosen do have in common, however, is the imperative responsibility of preserving the idea conveyed by the artwork, an integral part of an artistic object that sets it apart from other historical documents of human activity.

Contemporary art rarely uses traditional materials or at least does not employ them in the tried and tested ways in which they were employed in the past. Endless combinations of different materials and meanings

14 G. Wharton, 'Bespoke Ethics and Moral Casuistry in the Conservation of Contemporary Art', in: *Journal of the Institute of Conservation*, 41.1 (2018), 58–70 <https://doi.org/10.1080/19455224.2017.1417141>.

that are placed in them can make the conservation of contemporary art "uncharted territory". What quickly becomes evident is that Brandi's *Theory of Restoration*[15] and the ethical guidelines that have served us in navigating towards responsible conservation are no longer applicable in some contemporary art cases. We are faced with an array of messy solutions that sometimes result in having to accept the fact that some artworks perhaps become "unrestorable" or in any case "unexhibitable" over time. An umbrella approach to conservation ethics is no longer sustainable, and the necessity of being truly prudent in our decision making, considering all approaches and, most importantly, studying contemporary art pieces solely on a case-to-case basis is paramount. For now, an ideal and widely agreed on suggestion on the course of action regarding the conservation of contemporary works of art is perhaps still impossible to determine, so this seems like the safest way of ensuring the most ethical means of preserving the objects of contemporary art and the ideas conveyed by them.

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15 C. Brandi - G. Basile, *Theory of Restoration*, *Arte e Restauro* (Roma : Firenze: Istituto centrale per il restauro ; Nardini, 2005).

Penelope Banou, Athena Alexopoulou, Agathi Anthoula Kaminari

PHOTOGRAPHIC AND TECHNICAL EXAMINATION: A VALUABLE TOOL FOR THE CONSERVATION TREATMENT OF WORKS OF ART ON PAPER AND PARCHMENT

Zusammenfassung

Optische Untersuchungstechniken umfassen Beobachtung und fotografische Aufzeichnung unter Verwendung von Beleuchtung in verschiedenen Bereichen des Spektrums. Im sichtbaren Bereich können Restauratoren durch Variation des Beleuchtungswinkels und der Beleuchtungsposition Kunstwerke im Auf-, Streif- und Durchlicht untersuchen und aufzeichnen. Im nicht sichtbaren Bereich gibt es UV-induzierte sichtbare Fluoreszenz-Fotografie, UV-Reflexions-Fotografie, IR-Bildgebung, multispektrale und hyperspektrale Bildgebung und Falschfarben-IR-Bildgebung. Die vorgenannten Techniken sind ein wertvolles Instrument, welches Kunsthistorikern, Kuratoren und Konservatoren Informationen für die Bestimmung der geeigneten Behandlung von Kunstwerken auf Papier und Pergament liefern kann.

Keywords: non-destructive documentation, UV photography, multispectral imaging, hyperspectral imaging, false colour infrared imaging

Introduction

Photographic and technical examination can be a valuable tool for the study and conservation treatment of works of art on paper and parchment, useful for scholars, art historians, curators, and conservators. Technical examination is the first line of approach to the study of a piece of artwork. It is a non-destructive methodology, as it encompasses non-sampling examination methods for the support, media, surface and underlying layers of an object, by direct or magnified observation using a variety of illumination sources and techniques. In particular, it involves a methodology that uses illumination in the visible range and the non-visible range of the spectrum.

In the visible range, by varying the angle of illumination, conservators can examine and record works of art in normal (or visible) light, as well as raking and transmitted light. These photographic techniques can record the identification details of the works, but they can also provide information about the media, the technique, and the support, as well as the condition of the works. The techniques that involve recordings in the non-visible range of the spectrum include Ultraviolet-Induced Visible Fluorescence photography, UV reflectance photography, infrared imaging, multispectral and

hyperspectral imaging and false colour infrared imaging. All these are imaging techniques exploit different radiations to record the various layers of a work of art: the ultraviolet radiation only reacts with the surface layer of a work, the visible has the ability to penetrate transparent or semi-transparent materials, the infrared radiation penetrates opaque painting layers, while X-rays penetrate solid material with wood and metals.[1]

This technical examination can be used to determine the original materials of the object and the characteristics of these materials, to determine the history of the object based on the evidence of its physical condition, to detect the presence of alterations and their implications for the physical condition of the object, and to determine the presence of components or conditions that may influence conservation treatment and to aid in the evaluation of ongoing treatment. It precedes and guides instrumental analysis in which the structure and composition of the artwork are determined by analytical methods requiring sampling.[2]

The visible range of the spectrum: methods using visible radiation

Normal light photography

For the photographic setup, visible light sources of equal intensity, incident to the surface of the object should be placed at approximately 25° to the object, to give as even illumination as possible and to minimize surface gloss. The object should be perpendicular to the camera.[3]

This method reveals and records the following:

a. the artistic details of the work, the image or the design, the media and technique, the colouration of paper and special characteristics,
b. the identification details, like the signatures, collection and ownership stamps, notes, collection classification numbering, the name of the printer, the creator or the printing house,
c. the various effect of the technique on the paper support,
d. the original mount and method of hinging or the frame,
e. the presence of linings or secondary support,
f. the indications for previous use of the support,
g. the condition of the work, like the mechanical damages, the deformations and planar distortion, the discolouration, the chemical changes, the alterations and damage on media, as well as the previous treatments or interventions,
h. the stages and the results of conservation treatment.

Raking light photography

For the setup of the raking light photography, only one light source is needed, which is located on one side of the object at a low (raking) angle so that the projected light is almost parallel to the surface of the object. The standard 5-10° position used in photography may only reveal part of the information. However, changing the angle of illumination or proximity to the object can reveal different information or intensities of the problem.[4] The camera is placed perpendicular to the object.

Raking light photography can be used to study and record:

a. the painting or drawing technique, the surface textures and character of media,
b. the topography of paper and media,
c. the surface texture of paper, the degree of smoothness or burnishing of paper,
d. the characteristics of paper resulting from the method of manufacture,
e. watermarks and to distinct felt and mould impressions,

1 J. Dyer, G. Verri & J. Cupitt, "Multispectral Imaging in Reflectance and Photo-induced Luminescence modes: a User Manual", European CHARISMA Project, 2013.

2 *The AIC Guide to Digital Photography and Conservation Documentation*, ed. Jeffrey Warda, American Institute for Conservation of Historic and Artistic Works, Washington DC, 2011.

3 https://www.conservation-wiki.com/wiki/Visual_Examination_(PCC) (latest access 13-6-2019)

4 https://www.conservation-wiki.com/wiki/Visual_Examination_(PCC) (latest access 13-6-2019)

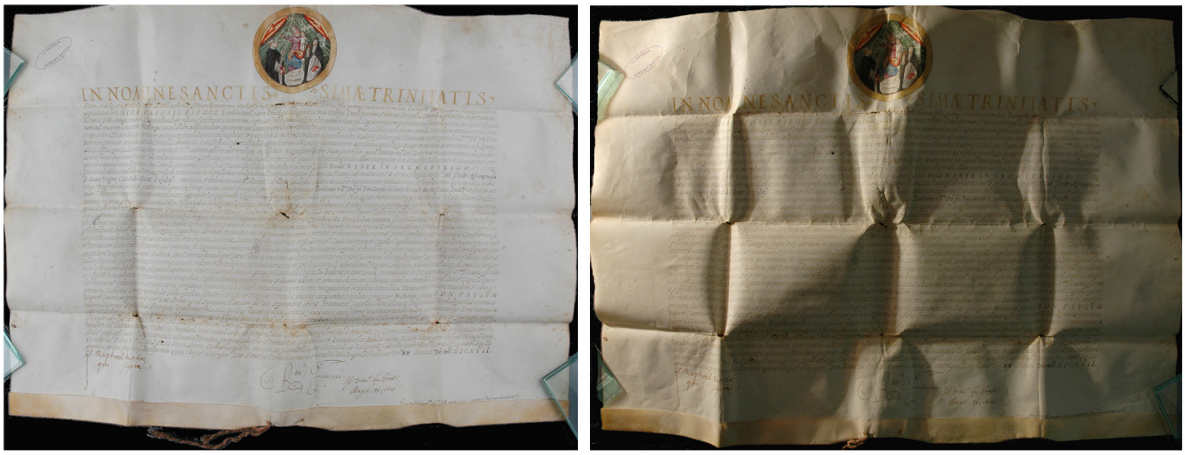

Fig. 1: Raking light photograph, a 17th-century patent letter for the foundation of the catholic brotherhood of Rosary in the Greek island of Naxos. Folding pattern of the document is evident

f. platemarks and embossing as a result of printing techniques and blind stamps,
g. the condition of the works, the damages on the surface and the core of the paper,
h. the results of folding practices (Fig. 1), but also the presence of ruling and pricking,
i. cracking of media, painting layers tenting flaking,
j. indentations made in prepared surfaces on paper by metal point, especially when drawing line colour has faded.

Transmitted light photography

For the photographic setup, the light source is underneath or beneath the work, at a vertical position. The light source commonly used is a lightbox or the work is held at a safe distance from a light source. The camera is perpendicular to the object.

Transmitted light is usually applied to reveal the presence of watermarks and to record them (Fig. 2), but it can also reveal and record:

a. paper structure and the method of paper manufacture, as well as the method of application of the watermark,
b. the thickness and opacity of paper, variations in sheet thickness,
c. the presence of impurities (like hair and wood chips), irregularities and defaults in pulp distribution, that provide indications for the quality of the paper support,

Fig. 2: Transmitted light photograph, a watermark depicting a foolscap with seven points, from a 17th-century print

d. inscriptions or drawings on the verso, concealed by linings,
e. the presence of mechanical damage (holes, tears, folds, thinned areas), the results of insect damage, previous treatment, but also the extent and intensity of discolouration.

Fig. 3: Visible light photograph (left) and UV induced visible fluorescence photograph (right), detail of a 17th c. printed map of Thrace (Greece) by Ortelius. In the UV-induced visible fluorescence photography, the yellow presents red fluorescence indicating cadmium yellow, while lack of UV-absorption points towards the absence of metal-containing pigments

Non-visible range of the spectrum: methods using UV radiation

For examination of works of art with ultraviolet illumination, UV visible induced fluorescence photography and UV reflectance photography can be used.

Ultraviolet induced visible Fluorescence Photography

This method is based on the ability of ultraviolet radiation to cause the visible fluorescence of some substances. The recorded information comes exclusively from the visible region of the spectrum, so all other radiations, such as ultraviolet and infrared, must be cut off. For this reason, barrier filters in front of the camera lens should be used. This technique can be applied both with cameras with film and digital cameras. Lamps emitting at 365nm (within the UV region) should be employed and set at symmetrical setup. The object must be perpendicular to the camera.[5]

Fluorescence varies in intensity and colour in different organic compounds. It also depends on the nature of the radiation. Fluorescence provides information about support, media and pigments. It can be seen with the naked eye and may be recorded photographically. In ultraviolet-induced visible fluorescence colour photography, the different fluorescence wavelengths of the substances result in the recording of different colours on the film. Different colour in the fluorescence of visibly similar substances shows differences in their composition. As some substances absorb the radiation without producing fluorescence, they show up as a deep purple or black, while others appear lighter. These differences can also be recorded in black and white ultraviolet-visible induced fluorescence photography, but images should be interpreted only by the change in the grey tones.

Thus, characteristic fluorescence, reflection, or absorption may provide indications for the use of specific media (e.g., titanium dioxide fluoresces deep purple and zinc

5 A. A. Kaminari, 'Copy letters using iron gall inks: An historical and physicochemical study for the development of a forensic analytical methodology incorporating both chemical and non-destructive imaging techniques' (unpublished doctoral thesis, Kingston University, Kingston upon Thames, UK, 2014), 88.

white and yellow-green), inks (e.g., iron gall ink which appears black, while carbon-based inks show no difference), and dyestuffs in coloured inks, pencils, and copy pencils that fluoresce distinctively (Fig. 3). In the same context, it can be used to study details obscured by darkening of support, faded inks (e.g., iron gall ink inscription, metal point sketch), suspected alteration or removal of ink.[6],[7]

This technique can also provide indications for the presence of fillers, additives, or optical brighteners in the support, as well as the application of a gesso priming or preparation. In transparent papers, it can provide indications for the method of manufacture (overbeating, or sparse paper pulp) or the presence of transparentizing agents like oils or resins as they fluoresce characteristically. Likewise, oil stains or the absorption of oil media by the paper support present the same behaviour.[8]

Additionally, the application of old varnishes (e.g., mastic, dammar) can be indicated as they fluoresce characteristically. Finally, various adhesives fluoresce characteristically (e.g., dextrins fluoresce blue-white; gum arabic fluoresces slightly, while animal glue yellow).

UV induced visible fluorescence photography can be useful for the assessment of the condition of the works and the results of conservation treatment. It can be used:

a. to discern the stage of deterioration of inked areas, when iron gall ink has been used as drawing media,
b. to indicate oxidation of cellulose caused by drawing, printing, or writing media as it fluoresces at first stages and then gradually turns to UV absorption,
c. to discern the provenance of foxing and to reveal the presence and extent of cellulose/media deterioration resulting from foxing,
d. to distinguish tidelines from other types of discolouration,
e. to distinguish adhesive residues from tapes and repairs,
f. to reveal and record the extent of mould damage on a work,
g. to discern the provenance of discolouration and distinguish between stains,
h. to discern rust stains and extent of damage,
i. to detect alterations and discontinuities in the homogeneity of paper, media or varnishes which result from erasures, loss, local treatments, repairs, retouching,
j. to study the changes caused by conservation treatment, or record and control the result of any intervention, e.g., tidelines caused by the local application of water or pH measurements, washing results on iron gall drawings.

UV reflectance photography

The value of the method is due to the different absorption levels that various surfaces exhibit in the ultraviolet region. The result is a high contrast image that can help differentiate between the areas and leads to their classifications based on their different physicochemical properties (Fig. 4). In this case, from all the reflected radiation, only the ultraviolet between 320nm and 380nm is of importance and must be recorded. For this reason, special barrier filters are used in front of the camera lens, that permit the passing of this wavelength only, while they cut off all other radiation. Lamps emitting within the UV region should be employed and set at symmetrical setup. The object must be perpendicular to the camera. As ultraviolet radiation is not visible, the use of colour films has no purpose, and black and white films should be used.[9]

6 https://www.conservation-wiki.com/wiki/Visual_Examination_(PCC) (latest access 13-6-2019).

7 A. Cosentino, 'Identification of pigments by multispectral imaging; a flowchart method', in: *Heritage Science* (2014), 2/8. http://www.heritagesciencejournal.com/content/2/1/8 (last access 7-8-2019).

8 P. Banou, A. Alexopoulou & B.W. Singer, 'Investigation of oil binder absorption into paper support with ultraviolet-induced visible fluorescence and ultraviolet reflectance photography', in: *e-Preservation Science journal*, 14 (2017), 1-8.

9 Kaminari, note 5, 87.

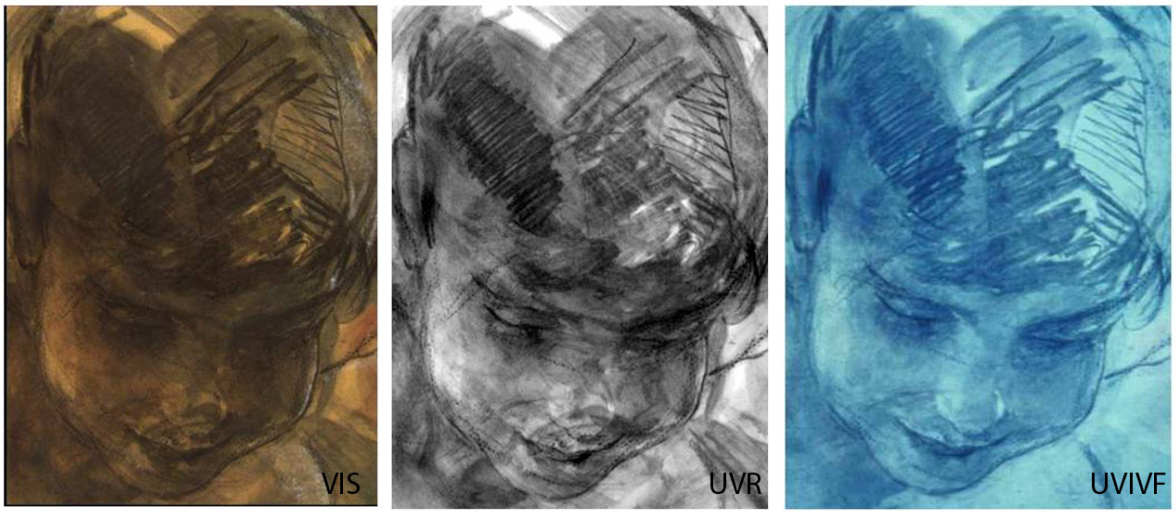

Fig. 4: Visible light photograph (left), UV reflectance photograph (middle), and UV induced visible fluorescence (right) of 19th c. an oil study on paper (detail). Comparative study of the images can provide details of the drawing technique and indicate the use of various media not discernible with the naked eye.

Non-visible range of the spectrum: methods using infra-red radiation

For the recording of works of art within the infrared region, IR photography, IR reflectography cameras, multispectral and hyperspectral imaging and false colour infrared imaging can be used. As substances react differently to near IR than to visible light, these techniques can be used to:

a. detect information visually incoherent, indistinct, or invisible parts of the composition,
b. reveal underpaintings, underdrawings, obscured or faded inscriptions, when created with carbon-containing media (carbon black ink, graphite, charcoal), which absorb IR strongly (Fig. 5),
c. read through linings or secondary supports,
d. read through discolouration and accumulated and embedded dirt,
e. reveal details of the technique or the changes in composition or any type of intervention,
f. provide indications for the presence of certain pigments and inks.

IR photography

In infrared photography, the film or image sensor used is sensitive to near-infrared light from about 760 nm to about 900 nm, which differentiates it from thermal imaging, which exploits the range of far-infrared radiation. It includes the use of films, and since they are usually also sensitive to visible light, a visible light barrier filter must be used. In the cultural heritage section, b/w films are employed in contrast to colour infrared photography which is mainly for artistic purposes.

IR reflectography

Infrared Reflectography is also a non-destructive diagnostic method for research of works of art, which takes advantage of the penetrating capability of the infrared radiation, between 760nm and 2700nm, through the upper colour layers of the object, thus multiplying the in-depth observation that can reach the sketches (Fig. 6). Use of longer wavelengths is forbidden, as in those regions the radiation can cause heat side effects that could damage the work of art. The detection of the infrared radiation is made with the help of an electronic system that transforms the non-visible radiation into a black-and-white optical image (i.e., the reflectogram).

Infrared reflectography provides useful information about the paint layers of an object, which cannot be confused with

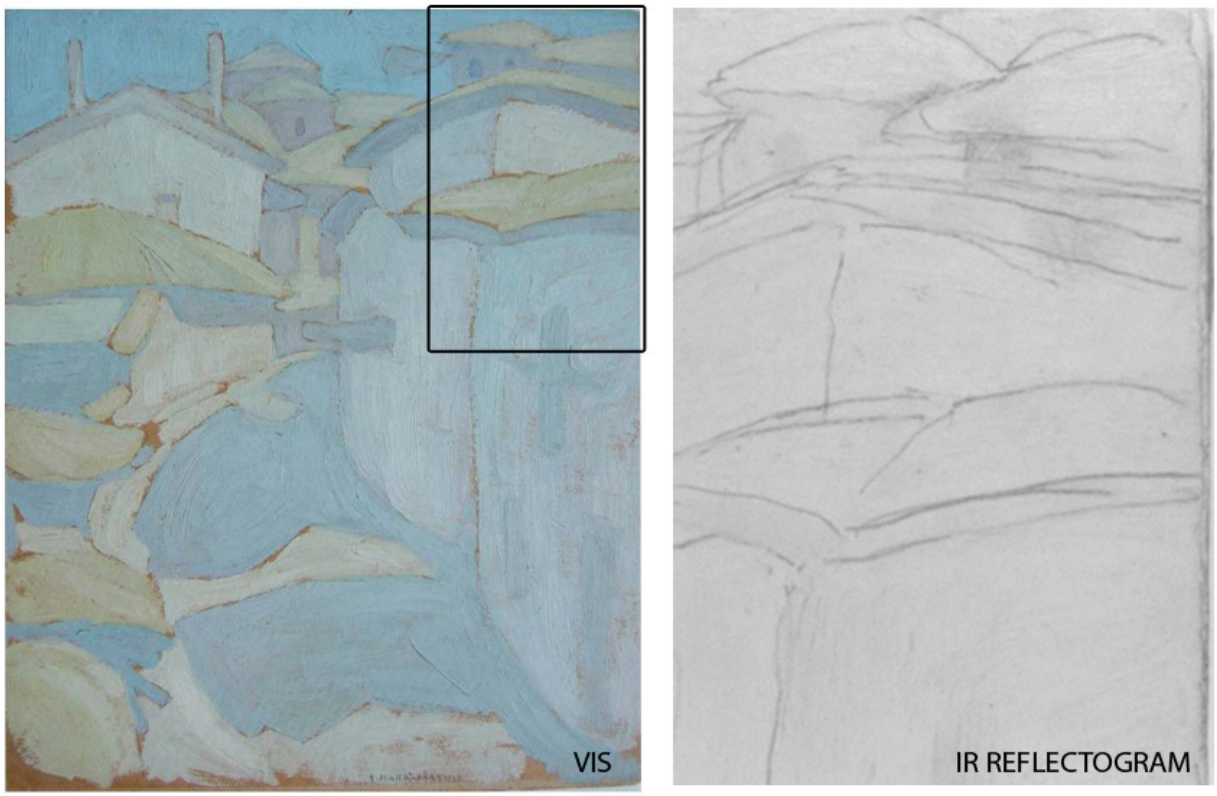

Fig. 5: Visible light photograph (left) and IR reflectography (right) of a 20th c. oil painting on paper board that reveals pencil underdrawings (detail of the marked area).

those of the substrate. The most important advantage of the method is that it can be combined with appropriate mathematical processing software. This multiplies the interpretation and measurement possibilities that describe and characterize the behaviour of the layers due to their different physicochemical parameters.[10]

Multispectral and hyperspectral imaging

Multispectral and/or hyperspectral imaging analysis or imaging spectroscopy is a non-invasive method of investigation that allows the simultaneous collection of spectral and spatial information of a surface in the visible and near-infrared regions.[11] Primarily used for underdrawing detection in paintings it has also been successfully applied to the scientific investigation of manuscripts, archival material, works of art on paper, the evaluation of conservation treatments and digital imaging for documentation.[12], [13], [14], [15] While infrared reflectography provides images of the continuous spectral area in the infrared, information is collected from specific and defined wavelengths in multispectral and hyperspectral imaging. In multispectral imaging, the infrared region is divided into five continuous bands, and in hyperspectral imaging into 34 different spectral bands.

10 A. Alexopoulou & I. Chryssoulakis, *Science and Works of Art* (in Greek), (Athens: Gonis Publishing, 1993), 171-182.

11 A. Alexopoulou, A. Kaminari, A. Panagopoulos, E. Pöhlmann, 'Multispectral documentation and image processing analysis of the papyrus of tomb II at Daphne, Greece', in: *Journal of Archaeological Science*, 40 (2013), 1242-1249.

12 P. Banou, A. Kaminari, A. Moutsatsou, A. Alexopoulou, B.W.Singer, 'Investigating the Conservation Problems of Oil Paintings on Paper Supports', in: *Works of Art and Conservation Science Today* (International Symposium, Thessaloniki, Greece 2010).

13 R. Padoan, Th.A.G. Steemers, M.E. Klein, B.J. Aalderink & G.de Bruin, 'Quantitative Hyperspectral Imaging of Historical Documents: Technique and Applications', in: *9th International Conference on NDT of Art*, Jerusalem Israel (2008), 1-10.

14 C. Fischer & I. Kakoulli, 'Multispectral and hyperspectral imaging technologies in conservation: current research and potential applications', in: *Reviews in Conservation,* 7 (2006), 3-16.

15 D. M. Chabries, S. W. Booras & G. H. Bearman, 'Imaging the past: recent applications of multispectral imaging technology to deciphering manuscripts', in: *Antiquity* 77, 296 (2003), 359-372.

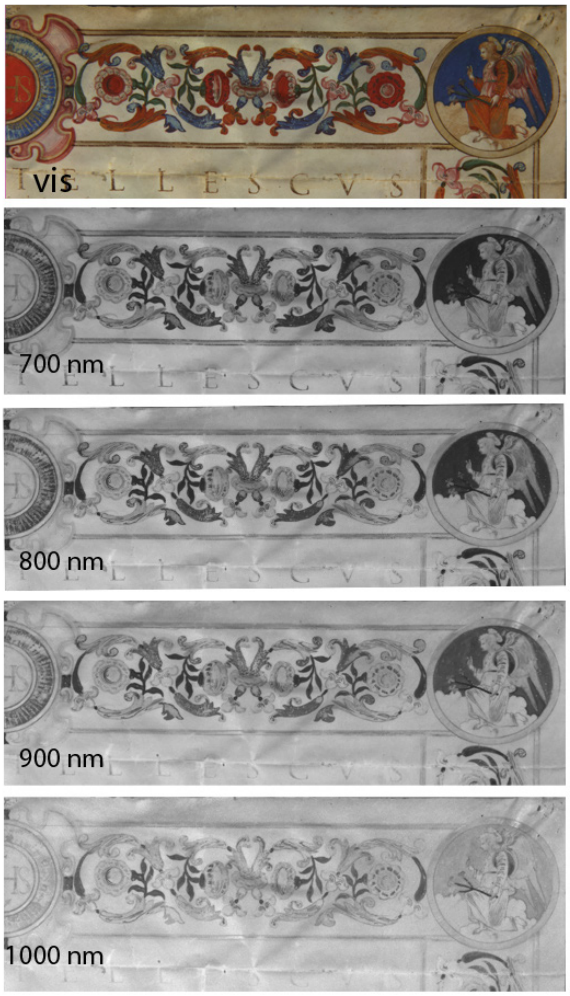

Fig. 6: Hyperspectral images in 700, 800, 900, and 1000 nm of the spectrum, detail of tempera decoration on a 17th c. Jesuit foundation document

This enables a more thorough study of the behaviour of the materials.

Spectral imaging systems used in conservation science are capable of acquiring and analysing spectral cubes that contain both spectral and spatial data.[16] The cube contains high definition images across multiple spectral bands that are used for calculating a full spectrum per image pixel. These systems usually comprise a filtering or dispersing device and a camera detector driven by specialized software to control image and data acquisition.

False-colour infrared

Another useful function of a multispectral technique is the infrared false colour recording of the object. Infrared colour images allow a sharper visualization of the original material because infrared radiation tends to be less scattered by thin cloudy layers such as varnishes, consolidants, glues. etc. that often cover the original surface. False-colour infrared has been used as a non-invasive method for studying coloured material *in situ* on paintings or manuscripts.[17], [18], [19]

The technique consists of the combination of images acquired in the green, red, and infrared regions to create a false-colour image that contains and highlights with colour the information from both the visible and the infrared regions. It is worth noting that the false colour is usually quite different from the true visible colour. The materials may have similar absorbance spectra in visible light, but they may highly differ in their near-infrared (NIR) absorbance. Thus, as the colours can be immediately perceived by the researcher, similar coloured materials may be differentiated and identified by their false colour rendition (Fig. 7). The specific false colour that each material produces depends on its interaction with IR light; the interaction is strictly related to the chemical composition of the material. Images can be obtained by using a mutispectral/hyperspectral camera and symmetrical lighting conditions, provided illumination includes both the visible and infrared regions.[20], [21]

16 Fischer & Kakoulli, note 13, 3-16.

17 A. Alexopoulou, N. Liaros, A. Panagopoulou & A. Kaminari, 'False Colour Infrared Imaging as a Tool for the Study of Pigments Used in Ceramics from Areas Within the Mediterranean Basin', in: *Conservation and the Eastern Mediterranean* (IIC Congress, Istanbul, Turkey 2010).

18 M. C. Buoso, D. Ceccato, D. Zafiropoulos, 'False-Color Infra Red Photography in the Identification of Pigments Used for a Late 13th Century Illuminated Manuscript', in: *Laboratori Nazionali di Legnaro (LNL) Annual Report, Applied and Interdisciplinary Physics Instrumentation* (2009), 153-154.

19 M. E. Klein, J. H. Scholten, Th. A. G. Steemers, G. de Bruin, 'Hyperspectral Imaging e A Novel Non-destructive Analytical Tool in Paper and Writing Durability Research', in: *Non-Destructive Investigations and Microanalysis for the Diagnostics and Conservation of the Cultural and Environmental Heritage* (Art '05, 8th International Conference, Lecce, 2005), 1-16.

20 Kaminari, note 5, 106.

21 Alexopoulou, Kaminari, Panagopoulos, Pöhlmann, note 11.

Fig. 7: Visible light photograph (left) and infra-red image (right) of a 20th-century tempera painting on paper. "Hellas" by J. Tsarouhis

Conclusion

Without a doubt, photographic and technical examination can provide valuable information for conservators, conservation scientists, curators, art historians and in general scholars of works of art on paper and parchment. Furthermore, comparative study of these images can provide an even better insight into the techniques, the materials and the condition of artwork on paper or parchment support.

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Francesco Baudone

FUNORI: NATURAL ADHESIVE FOR THE RESIZING OF PAPER MATERIALS

Riassunto

Negli ultimi decenni si è spesso osservato che i prodotti di sintesi utilizzati per le operazioni di restauro contenevano prodotti dannosi per l'ambiente, per l'uomo e soprattutto per le opere d'arte, spesso aggravandone lo stato conservativo. Per questo motivo, trovare prodotti che possano fornire una maggiore garanzia di stabilità nel tempo sta diventando una necessità sempre più diffusa, al fine di eseguire interventi reversibili, compatibili e meno invasivi sull'opera. In quest'ottica si è inserita la ricerca e la sperimentazione sul prodotto adesivo comunemente conosciuto come Funori, sempre più diffuso negli ultimi anni nel mondo del restauro. L'obiettivo di questo studio è stato quello di individuare se la sua applicazione per il rinsaldo di manufatti cartacei potesse essere un valido sostituto degli eteri di cellulosa comunemente impiegati.

Keywords: Funori, seaweed, resizing, paper materials, cellulose ethers

Introduction

From the moment of its invention and its dissemination, paper has undeniably replaced other supports such as papyrus and parchment as the material mostly used by mankind to record its testimonies. Official records of chancelleries and state institutions, private documents with legal and non-legal value, notebooks of sketches, drawings, annotations, prints, engravings, gazettes, and newspapers are part of a cultural background of inestimable historical, social, economic, and artistic value. Like all organic materials, paper is destined to perish over time, with wear and due to the environment within which it is confined. To avoid this loss, it is necessary to study programmes that prevent wear and, at the same time, allow the safeguarding of already damaged works of art.

Any conservation intervention requires an extensive knowledge of the materials on which it is necessary to operate and an equally high level of familiarity with the products to be used, bearing in mind their composition, their structure, and the possible responses to interaction in an environment with particular conditions of temperature, humidity, light, and atmospheric pollutants. It is, therefore, necessary to find methods, to study products and treatments

that are able to forecast or, at best, slow down the natural degradation of paper.[1] For the analysis of deterioration mechanisms, it is essential to know the nature of the material itself. The early European handmade paper was obtained from linen, cotton and hemp rags or even from a mixture of these, while the papers produced since the 19th century contain within them pulp extracted from wood through complex mechanical and chemical procedures.[2] The internal structure of paper is an overlap and interweaving of fibres on each other, and the final product is highly absorbent, unsuitable for writing. The operation of sizing is necessary, that is to add adhesive substances that regulate the absorption of liquids while giving the paper certain physical and mechanical characteristics.[3] The most commonly used adhesive substances in the history of Western paper production consist of wheat starch paste (not glue); animal glue produced from the scraps of skins, bones, horns, animal hooves; the adhesive mixture of rosin and potassium alum. Since the mid-20th century, synthetic products of various kinds have appeared, which soon superseded all previous materials due to their lower costs and greater simplicity of application.

Moreover, over the centuries, additives have been added to improve the optical and surface characteristics of the paper. Intervening on a work of art, regardless of its nature and type, is an extremely complex and delicate procedure. Without going too far into the details and methodologies that regulate the interventions on paper artefacts, be they library books or archival documents, engravings or drawings, the fundamental point is always the respect for the artefact on which we are to intervene. The conservation treatments on a paper object are always indicated by the object itself, from the type of paper support to the graphic mediations present and the artefact's usability. All the operations that we are to perform on an object, with all the necessary precautions and cautions, are themselves manipulations and constitute a modification of the nature of the artwork, changing and altering its physical and chemical characteristics. The restoration intervention must respect the parameters of minimum intervention, carrying out those operations that are strictly indispensable for the conservation and preservation of the object, using (theoretically at least) totally reversible products that should be unable to trigger forms of degradation, due to the alterations of the material of the work of art and of the materials that are used for all the necessary interventions.

In our study, the operation on which we concentrate is that of resizing, the intervention necessary and indispensable to reintroduce the correct quantity of adhesive inside the paper fibres, which was naturally lost or solubilized during the previous wet operations, such as washing. Resuming what has already been mentioned, the presence of glue is essential to paper, since it allows it to have those characteristics of writability, resistance, and protection from atmospheric agents, wear and the natural degradation of time; and the joining and cohesion of the fibres, which constitute the paper support thanks to the reduction of capillarity due to the adhesive. The importance of resizing is clearly evident during the various procedures that accompany the restoration of a work of art on paper. Naturally, this operation is bound to the type of support that must be treated, to its problems and to the final objectives of the intervention that will have to be performed. Similarly, the products used are various, consisting of cellulose ethers and prepared starting from aqueous

1 C.G. Lalli, P. Kron-Morelli, A. Brogi, F. Baudone, I. Tosini, *Funori, adesivo naturale per pitture murali e materiali cartacei* (Chieti: Linea Grafica editrice, 2016), 91.

2 A. Smith, 'Cellulose: In paper and textiles', in: *Paper and Textiles the Common Ground* (Preprints of the conference held at the Burrell Collection, ed. by F. Butterfield, L. Eaton, Glasgow, The Scottish Society for Conservation and Restoration, 1991), 1-17; C. Fellers, T. Iversen, T. Lindström, T. Nilsson, M. Rigdhal, *Ageing. Degradation of Paper. A literature survey*, FoU-projeket för papperskonservering, Report No. 1 E, (Stockholm, 1989); D. Hunter, *Papermaking. The History and Technique of an Ancient Craft* (New York: Dover Publications, 1978, 2nd edition).

3 M.T. Roberts, D. Etherington, *Bookbinding and the Conservation of Books. A Dictionary of Descriptive Terminology* (Washington: Library of Congress, 1981).

or non-aqueous solutions, depending on the type of object to be handled and the consequent reactions evoked on the paper surface following graphic mediations. The percentages also change, depending on the type of material to be treated, according to its thickness, flexibility, rigidity, porosity and the graphic mediations present. With an eye on these elements, an alternative to the more common cellulose derivatives used in resizing operations was sought. The research was directed towards a product that had adequate physical and chemical characteristics compatible with those of cellulose: good adhesive and cohesive power even at low percentages; low viscosity; complete affinity with aqueous solutions and total reversibility in the latter; neutral pH where possible, or at least one that does not, with the passing of time, lead to an acidic environment or a chromatic alteration of the paper's surface. The algae extract known as *Funori* seems to respond very well to all of these requests, as confirmed by the results obtained during the experiments performed.[4]

Funori: composition, preparatory methods, traditional use, and application in conservation

The seaweed species from which *Funori* is extracted, commonly called *funorans*, are substantially three and all very similar to each other: *Gloiopeltis tenax*, *Gloiopeltis furcata*, and *Gloiopeltis complanata*. There are many other subspecies all related to one of these.[5] *Funori* is the generic name given to the algae species of the genus *Gloiopeltis*, used for about three hundred years, having been mentioned for the first time in 1673 in Japan[6] as a sizing agent for textile and paper materials, as an additive and thickening agent for mortars, plasters, and ceramic products, in the field of food production and in that of the cosmetics and pharmaceutical industries. This algal derivative is a lightweight adhesive, which allows for its use in controlled operations, even when carrying out several substance applications in succession. It is considered a good surfactant, capable of increasing water wettability and is often used together with starch paste or animal glue, allowing better control of the viscosity of the solutions. It has a substantially neutral pH, variable according to the solution,[7] and good optical characteristics, able not to alter the refractive index of the treated surface.[8] A guarantee of its properties also comes from tradition. In the previous fifteen years, studies and research regarding this product have recorded a considerable increase, although to this day it remains relatively unknown. However, the mere fact that it has been used for more than three hundred years as an adhesive for paper materials is a sufficient stimulus to study in depth a product that could be a valid alternative to the most recent synthesis systems used in the restoration of paper materials.

In Japan a mixture of three seaweeds is used: *Ma-funori* (*Ma* - true, from *Gloiopeltis tenax*), *Fukuro-funori* (Fukuro - balloon, from *Gloiopeltis furcata*) and *Hana-funori* (*Hana* - flower, from *Gloiopeltis complanata*), which differ from each other in some key characteristics concerning mainly adhesive power, viscosity, and water solubility. These differences are also linked to the method of extraction, the place of origin and the mixing of these three types of Funori. The *Ma-* has a more effective adhesive

4 F. Baudone, *Il Funori e la carta. Studi e applicazioni pratiche per il rinsaldo di materiali cartacei* (unpublished dissertation, Istituto per l'Arte e il Restauro - Palazzo Spinelli, Florence, 2016), 50-51; Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 102-103.

5 Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 16-28.

6 V. J. Chapman, *Seaweeds and their uses* (London: Methuen, 1970), 143.

7 *Funori* solution does not develop an acid environment, as is claimed by A. Finozzi, C. Lodi, C. Sburlino, *Utilizzo della colla funori nel restauro* (Padova: il Prato, Speciale 4 - Supplemento a Progetto Restauro n. 62, 2012), 7.

8 T. Geiger, F. Michel, 'Studies on the Polysaccharide JunFunori Used to Consolidate Matt Paint', in: *Studies in Conservation*, 50, III (2005), 193-204; F. Michel, T. Geiger, A. Reichlin, G. Teoh-Sapkota, 'Funori, ein Japanisches Festigungsmittel für matte Malerei', in: *Zeitschrift für Kunsttechnologie und Konservierung*, 16 (2012), 257-275.

function, the Fukuro- has less adhesive power but is easily soluble in water, while the *Hana-* does not show the adhesive characteristics of the other two so it is tendentially used as a surfactant or colloidal substance, since it allows the extracted materials to remain dispersed in the aqueous solution.[9] *Funori* is a complex polysaccharide, a sort of fractioned agar containing sulphate elements (agarose-6-sulphonate),[10] and has a great affinity with cellulosic materials, such as wood and paper. It is a natural polymer whose chemical structure can show different forms that characterize its adhesiveness, viscosity, and solubility in water.

Moreover, it is a highly water-soluble substance due to the short polymeric chain, simultaneously showing good resistance to the humid environment, in addition to a certain chemical stability over time. The studies previously conducted on *Funori* show a certain variety of preparatory methods, all of them very similar to each other; we keep in mind that percentages, dilution factors, source of purchase or simply the preparation method are not always indicated. The mere fact that *Funori* is rarely treated before being put on the market can be an encouraging fact about the purity of the material to be used on works of art. Marketed in various forms, from dried algae to powder, up to the recent liquid form, *Funori* solution is used as an aqueous adhesive for the veiling operations and pre-consolidation of paper supports fixed on canvas in view of their detachment; as a consolidant at various percentages for pictorial mediums on various types of paper, silk, papyrus, wood and wall paintings; for temporary fixing of paper fragments in view of immersion washing operations; combined with other adhesives, such as isinglass or wheat starch paste, to improve its physical characteristics.[11] As can be seen, the sectors of restoration involved in these studies and applications are manifold as are the methods of use. In all cases, its qualities of mild adhesive and surfactant are exploited, capable of dissolving in water at room temperature and penetrating the supports on which it is spread. Critical is its supposed antimicrobial activity,[12] capable of inhibiting or slowing down the development of microorganisms that are harmful to the integrity of the works of art, as well as its characteristic of not altering, once dried, the optical refraction index of the surfaces on which it is laid.

Experimental

Generally, a solution can be prepared in two ways: hot or at room temperature; we are interested in the latter methodology for this study. The dried seaweed is previously rinsed in water and then put to swell in a given amount of water for a time ranging from six to twelve hours; the time is relative to the percentage that is prepared and to its intended use. Later, it is filtered through a fabric, most often cotton. The differences between these two procedures primarily concern the density of the solution, its adhesive power, the ability to penetrate the fibres and the final appearance. When in literature we talk about the physical characteristics of this product we almost always mean the solution prepared hot, in the traditional way: few and scarce studies are about the results of the preparation of *Funori* solution at room temperature. To overcome this issue and to attempt to open a new debate, the tests completed during this study were performed with a solution prepared at room

9 N. Hayakawa, T. Araki, S. Kainuma, T. Taguro, W. Kawanobe, 'Characterization of Funori-Extraction from the Red Seaweed as a Restoration Material', in: *Journal of the Japan Society for the Conservation of Cultural Property*, 48 (2004), 16-31.

10 Geiger, Michel, note 8, 193; S. Hirase, C. Araki, T. Itō, 'Constituents of the Mucilage of Gloiopeltis Furcata', in: *Bulletin of the Chemical Society of Japan*, 29, IX (1956), 985-987.

11 Baudone, note 4, 48-49.

12 D. Ren, H. Noda, H. Amano, K. Nisikawa, 'Antihypertensive and antihyperlipidemic effects of funoran', in: *Fisheries Science*, 60 (1994), 423-427; J. Zheng, Y. Chen, F. Yao, W. Chen, G. Shi, 'Chemical Composition and Antioxidant/Antimicrobial Activities in Supercritical Carbon Dioxide Fluid Extract of Gloiopeltis tenax', in: *Marine Drugs*, 10 (2012), 2634-2647.

Table 1. pH measurements of *Funori* solution prepared at room temperature

Funori **solution %**	**0.3**	**0.5**	**0.7**	**1**	**1.5**	**2**
pH	7.36	7.29	7.37	7.45	7.38	7.41

temperature, using dried seaweed sheets.[13] The concentration used was established by referring to the standard percentages used for cellulose derivatives in resizing operations, in order to obtain comparable results.

Furthermore, the choice to prepare the solutions at room temperature is related to the same methodology used for the preparation of cellulose adhesives, thus making it possible to compare the density and viscosity of the two products. The choice of room temperature preparation also has another motivation: the production of an easily penetrable adhesive, with very low viscosity values and weak adhesive power, necessary and sufficient to keep the fibres cohesive inside the paper support without altering their physical-mechanical properties, qualities unlike those obtained with hot-preparation protocols. Each sample of *Funori* was subjected to pH measurements: the results of the readings (Table 1), carried out three times for each percentage analysed, all fall within the neutral range with a slight tendency to alkalinity, an optimal condition for an adhesive to be used on a material that is extremely sensitive to acidic and basic environments, such as a paper support.

A high acidity, as well as an overly accentuated presence of alkalis, can trigger chemical reactions of hydrolysis and oxidation that would affect the conservation state of the artefact, accelerating its degradation. The readings of the pH values all fall within a measurement range within which the degradation reactions are buffered.[14] The tests were performed on various types of paper supports, both ancient hand-made and modern machine-made products. This choice was dictated by the desire to observe the behaviour of a resized paper with *Funori* at various percentages, knowing its chemical and physical nature: each specimen used was analysed with an optical microscope to investigate its fibrous structure and therefore its internal nature; it was subjected to histochemical staining tests to identify the original adhesives and wettability tests to determine the resistance of a paper to water penetration; finally to measurements of thickness and pH before, during and after the tests performed to monitor their behaviour at certain times of processing. Similarly, the graphic mediations present on paper supports differed from each other, ranging from ancient and modern printing inks to manuscripts (both ancient iron-gall ink and modern Indian ink). Solubility tests and pH measurements were carried out on each specimen, in order to obtain a framework including all the main aspects concerning the paper samples to be processed.[15]

Observations and discussions

The conclusions achieved from these experiments have confirmed our theories on the use of *Funori* algae extract instead of

13 For an accurate description of the preparation procedures of *Funori* solution and the comparison with the hot extraction protocols, see Baudone, note 4, 55-60; Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 29-35.

14 Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 91-100.

15 All the operations carried out for these studies, which lasted almost two years, are very long and to describe them exhaustively in this restricted space would be very difficult. In short, we report that all the paper samples were mechanically dry cleaned; tested the solubility of the inks and measured pH value; washed by immersion in deionized water and left dry at room temperature upon frames, measured again the pH of the washed paper; resized with *Funori* solutions at various percentages and left to dry again on frames, subsequently completing the drying operations under light weight; further pH measurement for a comparison value with the initial reading and finally the conservation of the various samples in environments with different level of relative humidity and temperature, in order to observe the behavior of the adhesive in various environmental conditions; see Baudone, note 4, 61-93; Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 109-130.

Table 2. Test results on sample B, made of ancient handmade printed rag paper ink

Samples	pH value unwashed paper	Initial thickness	pH value washed paper	Resizing solution %		pH value after resizing	Thickness after resizing
				Funori	Cellulose ethers		
B_1	6.77	0.083–0.106	7.11		**0.5**	7.74 [+0.63]	0.083–0.106
B_2	6.79	0.075–0.098	7.24	**0.3**		7.82 [+0.58]	0.075–0.098
B_3	6.69	0.084–0.104	7.18	**0.5**		7.77 [+0.59]	0.084–0.104
B_4	6.81	0.083–0.110	7.29	**0.7**		7.86 [+0.57]	0.083–0.110
B_5	6.66	0.091–0.113	7.12	1		7.75 [+0.63]	0.091–0.113
B_6	6.71	0.077–0.088	7.16	1.5		7.81 [+0.65]	0.077–0.088
B_7	6.74	0.069–0.086	7.10	2		7.73 [+0.63]	0.069–0.086

cellulose ethers.[16] The percentages between 0.3 and 0.7% gave us the best results for all types of papers tested, a concentration similar to that used with cellulose ether (Table 2). The adhesive perfectly penetrated the paper fibres, giving them suitable mechanical consistency without altering their flexibility, elasticity and, at the same time, giving the paper a natural and uniform sound.

These tests also revealed other critical factors: first, on the surface there were no halos or lucidity of any kind, showing that a dried filmogenic application of *Funori* does not alter the paper surface on which it is spread; moreover, there were no variations in thickness with respect to the same measurements made before proceeding with the resizing operations, confirming the excellent penetrative capacity of the adhesive solution. As can be well noted, all the values of the tests fall within a slightly alkaline environment, within that range of values capable of buffering the chemical reactions of hydrolysis and oxidation. A preliminary conclusion about the results of these first tests led us towards encouraging considerations. In fact, the *Gloiopeltis* extract would appear to be a more than valid alternative to the common synthetic adhesives derived from cellulose, capable of transmitting the correct amount of adhesive needed and sufficient for the paper support in the correct concentrations to reacquire its natural mechanical properties.

The properties of an adhesive are also assessed by its ability to make itself susceptible or not to the proliferation of microorganisms. These elements can participate in the degradation process of the work of art, with damage that is often unrecoverable on paper. Their development can be favoured by many environmental factors, and their growth is often disjointed from the optimal conditions for their proliferation. There are various types of microorganisms that attack paper materials, attracted by the cellulose itself or by those substances present on its surface, such as adhesives. The ease of alteration due to biological elements of the starchy and proteinaceous glues, both materials of organic derivation, is well documented.[17] Although the *Funori* solution extracted from *Gloiopeltis* must also be included in this last

16 Generally, the percentages used in resizing operation are between 1 and 2%, according to the reference standard for the conservation treatments of paper materials. We must emphasize that each product has unique characteristics, and this does not correspond with the practice of generalizing the products. The cellulose ethers used for the comparison with the *Funori* solutions (Tylose® MH 300 p, Glutofix® 600 and Klucel® G), applied with the percentages commonly indicated, gave us a completely erroneous result. For each test, the percentage of cellulose ethers was found for that particular type of sample and, at the end, we have been obtained good results with Tylose® MH 300p at 1%, Glutofix® 600 at 0.5% and Klucel® G at 1.5%; see Baudone, note 4, 50-52, 80-81.

17 See *Handbook of Adhesives*, ed. by I. Skeist, (New York: Robert E. Kreiger Publishing Co., 1977), 170.

category, unlike the other two adhesives, numerous studies have proven the capacity of *funorans* to resist the development of mould and bacteria, slowing or altogether inhibiting their proliferation. Upon completion of the research, it was considered essential to perform vitality tests to confirm or disprove these statements, as well as to have at the same time a complete picture of the performance of *Funori* employed in the restoration of paper materials. In this study, two different vitality tests were carried out using Petri dishes with agar and microscope slide holders to observe the development of microorganisms in environments that had or did not have a nutritional substrate. A small and identical quantity of each adhesive was placed inside the sealed Petri dishes, while on the slides each adhesive[18] was applied in five consecutive layers. The results obtained were significant for the answers we were looking for: *Funori* seaweed extracts opposed a total resistance to the proliferation of biological agents even when in extremely favourable environmental conditions. Therefore, we can justifiably expect a similar result even in the conditions of the conservation standards indicated for paper materials, with humidity rates of around 30–40% and a temperature near 10 °C,[19] although indeed a generalization appears out of place given that the combinations of the elements that can lead to the proliferation of microorganisms are multiple and not linked solely to the conservation environment but also to the nature of the material itself and its usability.

To conclude this study and to observe the behaviour of both paper samples and *Funori* solutions over time, each test performed was subjected to monitoring in environments with different temperatures and relative humidity percentages, in order to determine whether the adhesive could lead to changes or variations, such as stiffening, yellowing, increased acidity or alkalinity, analysing the physical properties and measuring the pH at regular intervals of three months. There are many different ways and environments of conservation for works of art on paper. Unfortunately, not all objects can benefit from these conservation standards, and the risk of deterioration of the paper artefact, whatever its nature, due to incorrect storage is very high. The environmental conditions that have an effect on the object and all the individual elements from which it is composed: from the type of paper to graphic mediation, up to the materials of which its binding is constituted, whether it is a library book or even of an archive register.

Even the adhesive substances are involved in the search for the balance between the artefact and the environment that surrounds it, playing an essential role in the protection of the work of art or in the acceleration of its degradation. Each adhesive substance has its particularities that make it react and behave differently in the various types of conservation environments. In order to observe the environmental integration of a resized paper with *Funori*, the various samples used for the experiments were conditioned in different conservation rooms, carrying out a quarterly rotation of the environments with pH measurements for each paper support studied. All the papers tested in this study were located inside a folder made of thin cardboard sheet with a neutral pH, inserted between two thick pieces of cardboard for storage at neutral pH and the whole package wrapped in paper. These measures were used to keep the sample papers in an acid-free or alkali-free environment, in order to avoid an unnatural alteration of the pH values with consequent inaccurate readings, while the outermost coating paper served to protect the samples from dust and atmospheric particulates of various nature that would have been deposited on the surface during the period of alternation in the conservation

18 Modified wheat starch paste, animal hide glue, Vinavil®59, Glutofix®600, Tylose®MH300p, Klucel®G, *Funori* solutions. All the samples were subjected to 100% of relative humidity and temperature between 15-25 °C, with sunlight exposure of about six hours daily for a total period of three months; see Baudone, note 4, 91-93; Lalli, Kron-Morelli, Brogi, Baudone, Tosini, note 1, 49-52.

19 See 'IFLA Principles for the Care and Handling of Library Material', ed. by E.P. Adcock et al., in: *International Preservation Issues*, 1 (Paris: IFLA PAC, Washington DC: CLIR, 1998).

Table 3. pH measurements of handwritten supports on handmade (A-B-C) and machine-made paper (D) after one year of environmental monitoring

Samples	*Funori* solution %	pH value after resizing	Values of the first environmental monitoring cycle			
			I 10°C + 40% UR pH ±	II 25°C + 40% UR pH ±	III 10°C + 60% UR pH ±	IV 25°C + 80% UR pH ±
A	0.3	7.56	7.54 [-0.02]	7.60 [+0.04]	7.58 [+0.02]	7.55 [-0.01]
B	0.3	7.52	7.57 [+0.05]	7.50 [-0.02]	7.53 [+0.01]	7.56 [+0.04]
C	0.3	7.62	7.64 [+0.02]	7.59 [-0.03]	7.60 [-0.02]	7.63 [+0.01]
D	0.3	7.35	7.39 [+0.04]	7.41 [+0.06]	7.40 [+0.05]	7.39 [+0.04]

environments. The decision to use a paper made of pure cellulose with a neutral pH was dictated by scrupulousness and by the desire to isolate in the most neutral way possible the samples treated with *Funori*. The premises for the execution of this monitoring were chosen based on two essential elements in the field of conservation: temperature and relative humidity.[20] For these two factors, four different combinations have been found that are capable of ensuring the change of at least one of the two components. The samples were stored separately, grouping them according to type and avoiding putting them directly into contact with each other.

After one year of monitoring (Table 3), none of the values recorded on the samples underwent drastic variations. We have also found that *Funori*, like the most commonly used cellulose ethers, manages to maintain its physical and chemical characteristics when the environmental conditions of temperature and relative humidity change.

At the same time, at the first tactile observation, all the papers maintain their mechanical properties of elasticity and flexibility, without altering the naturalness of the sound during stress. All the pH readings taken at the end of each cycle remain within those ranges originally detected, since the small variations that are found can be explained by with the normal internal variations in the paper support in relation to the surrounding environment. All the samples reacted in the same way to the various conservation environments, finding a thermo-hygrometric equilibrium that does not alter their internal status and allows them to maintain the pH at levels optimal for good conservation. Even the presence of inks of various kinds does not alter the properties of the *Funori* adhesive, and above all the characteristics of the graphic mediations themselves, since the latter do not show any optical-chromatic alteration. The acidic nature of the manuscript inks can be an excellent vehicle for the degradation of the object support.

Similarly, the nature of the raw material and the modern paper-processing processes, which lead in a short time to the creation of a diffused acidic substrate on the whole artefact, can also accelerate its degradation. The resizing with the algae extract seems to be able to buffer these reactions and to create an optimal internal environment both for the inks and for the paper itself, as well as guaranteeing the paper artefact physical-mechanical stability. After four years of monitoring, both ancient and modern manuscript papers still present the initial tactile characteristics: no roughness or stiffness appeared more or less marked, as well as no alterations to the inks and to the seals in red

20 The factors to be taken into consideration are many more and include light, mould, insects and other pests, air and dust pollution. In this case, placing the samples between two thick pieces of cardboard and wrapped the whole package in paper, the problems caused by light, mold, insects and various pollution do not arise.

Table 4. pH measurements of handwritten supports on handmade (A-B-C) and machine-made paper (D) after four years of environmental monitoring

Samples	*Funori* solution %	pH value after resizing	pH value after the first cycle	Values of the fourth environmental monitoring cycle			
				I 10°C + 40% UR pH ±	II 25°C + 40% UR pH ±	III 10°C + 60% UR pH ±	IV 25°C + 80% UR pH ±
A	0.3	7.56	7.55 [-0.01]	7.54 [-0.02]	7.53 [-0.03]	7.53 [-0.03]	7.58 [+0.02]
B	0.3	7.52	7.56 [+0.04]	7.54 [+0.02]	7.48 [-0.04]	7.50 [-0.02]	7.49 [-0.03]
C	0.3	7.62	7.63 [+0.01]	7.62 [±0.00]	7.65 [+0.03]	7.60 [-0.02]	7.61 [-0.01]
D	0.3	7.35	7.39 [+0.04]	7.37 [+0.02]	7.38 [+0.03]	7.34 [-0.01]	7.36 [+0.01]

wax. At the same time, the internal environment was still settled on the original values (Table 4), confirming our thesis about the suitability of the *Funori* seaweed extract for the operations of resizing paper materials.

Conclusion

The field of conservation is a sector in continuous growth, aimed at the achievement of a fascinating but arduous goal: to preserve a work of art. Every year, new methods of analysis and intervention are developed with the precise goal of making the usability of an object, whatever its nature, more and more durable. The restoration of paper materials is often considered to be a minor, secondary art, with lower visibility than that attributed to other sectors. The conservation processes of a book, an engraving or a drawing involve considerable skills and knowledge that only study and experience are able to guarantee, in addition to research and experimentation with new techniques and products. This study intends to link to this last line: to investigate and develop a new type of adhesive to be used in the paper sector. *Funori* has all the essential features for the success of the operations: it is absolutely compatible with cellulose being also a polysaccharide; if used in suitable percentages for the operations, it allows a full and total penetration of the adhesive inside the paper fibres, in virtue of its low viscosity; has a neutral pH with a slight tendency to alkalinity; it is absolutely reversible both in hot water and room temperature water; does not alter the optical properties of the support on which it is spread. Added to this is its ability to inhibit or slow down the development of paper-damaging microorganisms, although this field is still to be explored in detail. In any case, it is necessary to make a clarification: the tests conducted so far, carried out in the best possible way and in an attempt to obtain all the information necessary and indispensable to answer the questions that naturally arose during these studies, have no absolute value. The percentages used here were those we consider suitable for the papers used, but this does not exclude its use at higher percentages for the same operations on other types of paper supports, whether they are antique handmade or modern machine products. This research is intended to be a further step on the road towards a common goal. I hope that this research can serve as a stimulus to conduct further studies and experiments within a fruitful dialogue with a single protagonist: the work of art.

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Gwen Spicer

MAGNETS: SOME PHYSICS EVERY CONSERVATOR NEEDS TO KNOW

Résumé

La compression est un problème important lors du traitement des artefacts en papier, mais elle est de moindre importance avec le cuir ou le parchemin. La cellulose a une résilience relativement faible, la capacité de retrouver la forme; les peaux d'animaux sont le contraire. Ces propriétés sont liées au degré de partage d'électrons entre les matériaux, qui détermine leur placement relatif sur la série triboélectrique. Certaines combinaisons de matériaux ont de meilleurs pouvoirs de détention que d'autres. Le matériel choisi pour être en contact avec un artefact pourrait-il également contribuer à la préservation d'un artefact ou à son soutien? La philosophie de longue date parmi les restaurateurs de «comme avec comme» peut-être besoin d'être réexaminé.

Keywords: Compression of paper, magnetic mounting systems, resiliency of leather, Triboelectric series

Compression

Compressive strength is the capacity of a material or a structure to withstand perpendicular forces against its surface. When the limits of compressive strength are reached, a material is crushed. Museum professionals have long held that this risk of damage from compression is a significant disadvantage of using magnets. What materials can sustain compression? What is the effect of the age or structure of the material on compressive strength?

Compressive strength is usually reported in relation to specific technical and industry standards that have slowly evolved. However, many museum professionals are hindered by the fact that many artefacts have not been tested against technical standards. Changes that occur as materials age also reduce artefacts' compressive strength. Artefacts are not merely raw materials, but rather materials that have been manipulated and manufactured into an end product, and then further altered by cultural use and wear.

A specific material's thickness, its method of manufacture, any added coatings, and its loft all help determine a material's potential to become compressed. The material's method of manufacture and structure also helps determine its physical response to compression; for leather, the fibrous

structure has been subjected to many methods of processing over the years to maintain its viability as a material. For paper, fibres are pounded and made into a slurry before being formed into a sheet and then finished with coatings and fillers. Newer materials withstand longer-term compression better than older materials do. Another factor that influences compressive strength is how long a material has been under constraint.[1] Surface deformation has been known to occur for works of art on paper that have been matted for an extended time;[2] this same phenomenon can occur in magnetic systems, wherein gap materials become burnished. An artefact's history of use, as well as how it was manufactured, can play a role in how compressed it is. For example, well-used moccasins will have soles with more fully compressed leather fibres.

Resiliency

Resilience describes a fibre's ability to return to its original shape. It is the ratio of the energy of retraction to the energy of deformation and is influenced by temperature, moisture content, rate of strain, retraction, and strain history.[3] Various materials are rated on a scale of resiliency (Table 1). [4] Materials that show good tensile recovery also tend to have high compression recovery.[5] Cellulosics as a group have low resiliency, as is evidenced by plate marks on prints. This may partially explain why paper conservators often see compression as a result of using mounts with magnets on the surface of the work of art. Of course, an artefact's previous use—either historically or while in a museum—will affect the extent of its compression. An example is bark cloth, also a type of cellulose, that is thoroughly "beaten" during its manufacturing.[6] Polyester materials, in contrast, are on the opposite end of the resiliency scale; having very high resiliency, with protein-based materials immediately below.

Table 1: General resiliency ranking by material

Material	Resiliency
Polyester	High
Wool / proteins	
Nylon	
Acrylic	
Olefin (PE, PP)	
Triacetate	
Silk	
Acetate (secondary)	
Cotton	
Rayon	
Flax	Low or poor

Another quality to consider when choosing a material in contact is "loft", which is the amount of curvature to which an artefact is required to respond. Conservators often prepare a soft surface for a leather artefact to rest on; while works of art on paper are on hard surfaces. Figure 1 illustrates padding being placed below an artefact and below the magnet. It is possible for a padded layer to prevent the compression of an artefact. Selecting the right materials and placing them in well-considered locations in the magnetic system can reduce compression, especially with magnetic point fastener systems. For instance, one can select a padding material softer than the artefact to reduce compression. The artefact will then have at least one direction it can move in; if it is surrounded by two hard surfaces, it will have nowhere to move and will become compressed.

1 A. de Graaf, 'Tensile Propoerties and Flexibility of Textiles', in: *Conservazione e Resauro dei Tessili*, ed. by F. Pertegato (Milano: CISST, 1980), 54-61.

2 J. Vuori, R. Dancause, and S. Michalski, 'Renewing the Past: Pressure Mounting Two Large Fragmented Flags', in: *Textile Specialty Group Postprints*, 23 (2013), 161-80.

3 Dillon, 'Resilience of Fibers and Fabrics', in: *Textile Research Journal*, 17:4 (1947), 207-13.

4 M. Ballard, 'Mechanical Properties: Preview and Review', in: *Textile Conservation Newsletter*, 28 (1995), 4-28.

5 W. Morton and J. Hearle, *Physical Properties of Textile Fibers* (London: Butterworths, 1962).

6 G. Spicer, 'Mounting Barkcloth with Rare Earth Magnets: the Compression and Fiber Resiliency Answer', in: *Recent Advances in Barkcloth Conservation & Technical Analysis Postprints*, <Kew Gardens, UK, 7 December 2018>.

Fig. 1: Compression and loft, schematic illustration; a) An artefact being compressed within the magnetic system, b) An artefact conforming to the magnet on a padded surface, c) An artefact with cushioning below the magnet

Adding a thin, soft surface to the underside of a magnet provides additional support to the artefact by absorbing compression (Fig. 1). Paper or photographic artefacts need to rest on a denser material. In a magnetic system, placing the padding material below the magnet is a possible solution, as depicted in Figure 1c.

Static Charge and the Triboelectric series

All matter is composed equally of both positive and negative charges.[7] The basis of electrostatic charging is a surface phenomenon in which the disruption of the condition of equilibrium is seen in the neutral atom.[8] The static charge occurs when materials initially in contact are separated without any apparent rubbing or when materials are rubbed together. More static is created with rubbing than with simple contact and separation.[9] [10] When materials are in contact, electrical charges develop—which is something that a conservator usually seeks to avoid when working with collections.[11] Electrical charges occur when bonds between electrons, which

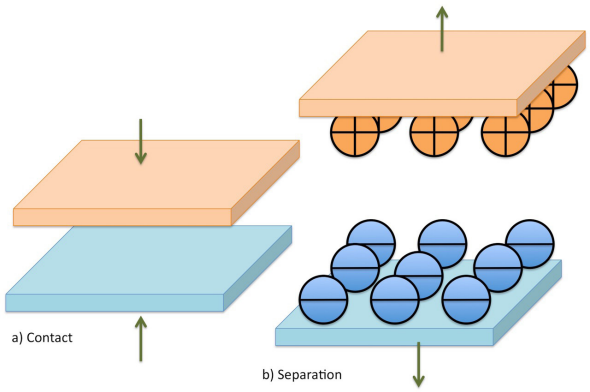

Fig. 2: Schematic of electron exchange when two different materials are in contact and are then separated

are established when materials come into contact, are then broken upon separation (Fig. 2).[12] [13] [14] [15] [16]

Materials that can gain or lose electrons are called triboelectric materials. The order of the propensity to gain or lose electrons is called the triboelectric series.[17] The series is based on the conductivity of the individual material. The level of charge is linked to a material's placement in this series (Table 2). It is the distance of the two materials from one another on the series that

7 S. Sello and C. Stevens, 'Antistatic Treatment', in: *Handbook of Fiber Science and Technology*, vol. II: *Chemical Processing of Fibers and Fabrics, Functional Finishes, Part B*, ed. by M. Lewin and S. Sello, (New York: Marcel Dekker, Inc., 1984), 291-313.

8 L. Commoner, 'Static Electricity in Conservation', in: *ICOM Ethnographic Conservation Newsletter*, 18 (1998).

9 A. Blythe, 'Anti-Static Treatment of 'Perspex' for Use in Picture Frames', in: *Studies in Conservation*, 19:2 (1974), 102–4.

10 Sello and Stevens, note 7, 291-313.

11 L. Gercia-Vedrenne and K. Thompson, 'Working With and Against Static Charges', <New England, American Institute for N NOTEConservation 47th Annual Meeting, 13-17 May 2019>.

12 R. Carleton, *Vitalized Physics* (New York : College Entrance Book Company, Inc., 1962).

13 R. Allen, Triboelectric Generation: Getting Charged (Chino: Desco Industries Inc., 2000).

14 M. Ballard, A. Gentry, and N. Dalela, 'The Triboelectric Series with Silk & Plexiglas Pressure Mounts', in: Tip Session <Houston, TX, American Institute for Conservation 46th Annual Meeting, 31 May – 2 June 2018>.

15 G. Ioanid, D. Parpauta, and A. Vlad, 'The Electrostatic Behaviour of Materials Used in Restoration-Conservation Process', in: *Journal of Optoelectronics and Advanced Materials*, 7 (2005), 1643–49.

16 M. Suh, A. Seyam, W. Oxenham, and T. Theyson, 'Static Generation and Dissipation of Polyester Continuous Filament Yarn', in: *The Journal of the Textile Institute*, 101:3 (2010), 261–69.

17 Sello and Stevens, note 7, 291-313.

Table 2: Material Order of the Triboelectric Series

Charge	Material	Notes
+ + +	Air	
	Polyurethane foam	
	Hair	
	Nylon, Dry skin	Dry skin has the greatest tendency to give up electrons and becoming highly positive in charge.
	Glass	This is why TV screens collect dust on their surfaces.
	Acrylic, Lucite	This is why these materials are not used to frame pastels.
	Leather	
	Rabbit's fur	Fur is often used to create static electricity.
	Quartz	
	Mica	
	Lead	Surprisingly close to cat fur.
	Cat's fur	
	Silk	
	Aluminum	
	Paper	
	Cotton	Best for non-static clothes
	Wool	
NEUTRAL		
	Steel	Not useful for static electricity
	Wood	Attracts some electrons, but is almost neutral
	Amber	
	Sealing wax	
	Polystyrene	
	Rubber balloon	
	Resins	
	Hard rubber	
	Nickel, Copper	
	Sulfur	
	Brass, Silver	
	Gold, Platinum	
	Acetate, Rayon	
	Synthetic rubber	
	Polyester	
	Styrene and Polystyrene	Why packing peanuts seems to stick to everything.
	Plastic wrap	A.k.a. “Cling” wrap
	Polyethylene	
	Polypropylene	
	Vinyl, PVC	
	Silicon	
	Teflon	Teflon has the greatest tendency of gathering electrons on its surface and becoming highly negative in charge.
	Silicone rubber	
- - -	Ebonite	

Table 3. Material types commonly found in artefacts, their position on the series and suggested display material content

Material type of the Artifact		Material's position on the Series	Suggested Material types for Display
Cotton	Cellulose	Immediately above neutral	Polyester, Rayon (further down the series)
Leather	Protein	Well above neutral	Cotton, rayon, polyester (further down the series)
Nylon	Synthetic	Above leather	Cotton, rayon, polyester (further down the series)
Rayon / Acetate	Synthetic	Well below	Cotton, Silk (further up the series)
Polyester	Synthetic	Below rayon	Cotton (further up the series)

increases the charge effect rather than the specific location in the series. Therefore, if two materials in contact are neighbours on the scale, there is less exchange. However, exchange occurs if they are far apart, no matter where on the scale.

Mounting material section using the series

Could the use of the series and its adhesion capabilities be part of the consideration in selecting the material type for the mounting of an artefact? It is possible that the selection provides added support in conjunction with adhesive or other methods of attachment. The amount of distance and its associated benefit is not fully known or understood.[18]

When a display material is selected, its composition should be located some distance on the series for the artefact's composition. For many cases, this would introduce more synthetic materials and blends that are not typically standard (Table 3). Most studies focus on the reduction of this naturally occurring phenomenon, but conservators could embrace it. The addition of polyester with cotton does contribute to increasing electron exchange.[19] [20] In fact, the higher the percentage of polyester, the more sharing occurs.

Conclusion

The investigation of magnetic mounting systems leads to several findings regarding material behaviour.[21] First, cellulosic fibres are made of low-resiliency-rated materials. Introducing the concepts of the triboelectric series and resiliency has the potential to help explain why compression occurs in some materials and not others. Are there potential methods for limiting this effect?

The unique ways that polyester, nylon, and other synthetics impact magnetic systems can only be explained by considering surface characteristics, frictional forces, electrical changes and resiliency. For instance, the reason paper is "noticeably" compressed is because of its low resistance characteristics. Understanding these phenomena always involves calling on a mixture of physics and textile science. However, more research is needed to fully understand all of the forces that are present when materials come into contact with each other.

18 G. Spicer, 'The Principles of Creating a Magnetic Mounting System: The Physics Every Conservator Needs to Know', in: *ICON Textile Group 2017, From Boxes to Buildings: Creative Solutions for the Storage of Textiles and Dress*, ed. by S. Glenn ACR and K. Smith (Bath, UK : ICON, 2017), 59–75. G. Spicer, 'Why do Polyester Fibers Attach so Well to Wool?', in: *Inside the Conservator's Studio: An Art Conservator's Journal*, created: November 1, 2017, available from: https://insidetheconservatorsstudio.blogspot.com/2017/11/why-do-polyester-fibers-attach-so-well.html (accessed 14 August 2019). G. Spicer, 'The Triboelectric Series: An Introduction', in: *Annual Textile Specialty Group Tip Session* <Houston, TX, American Institute for Conservation 46th Annual Meeting, 31 May – 2 June 2018>.

19 K. Shoush, M. Mohamed, H. Zaini, and W. Y. Ali, 'Measurement of Static Electricity Generated from Contact and Separation of Clothes and Car Seat Covers', in: *International Journal of Scientific & Engineering Research*, 4:10 (2013), 33-8.

20 M. Mahmound and A. Ibrahim, 'Friction Coefficient and Triboelectrification of Textiles', in: *Journal of Multidisciplinary Engineering Science and Technology*, 3:2 (2016), 3970-6.

21 G. Spicer, *Magnetic Mounting Systems for Museums and Cultural Institutions* (Delmar: Spicer Art Books, 2019).

Conservators routinely regard static as an unavoidable difficulty.[22] From the above discussion, the exchange of electrons and the build-up of static charge could also be beneficial, aiding in support.

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22 C. Jenkins, 'Survey, Static Electricity in Conservation', in: *ConservationDistList*, distributed April 10, 2018. Available from: https://docs.google.com/forms/d/e/1FAIpQLSe972ZMp7P-qRN33Dq7jWQQxogXjCUKYBEAQWIekWhCzAYmsA/formResponse (accessed 12 January 2019).

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