Managers of Decay
Here we are!

The management of aesthetics and decay

Conservation science ... or science for conservation?

Abstracts of both Master’s- and post-Master’s-theses

Professors, lecturers and management

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Colophon
Introduction

Here we are!
In 2005, the University of Amsterdam, was passed the baton from the Dutch Cultural Heritage Agency (then ICN, now RCE) and the SRAL (Foundation Conservation Studios Limburg) to further develop and maintain the educational programme for conservator-restorers in The Netherlands. Now that the fourth group has graduated the University, we can leave the early hectic years behind us and take a moment to realize how much we have accomplished. Together with our partners, the RCE, SRAL, the RMA and many other museums and institutes that deal with cultural heritage, we are trying to establish our Dutch educational and research programme in the conservation and restoration of cultural heritage within the international field. In the last mid-term review of the programme in 2010, the final conclusion of the panel was: “The programme is among the leading conservation programmes in Europe”¹ which gives us enough reason to keep firmly upon this road. By incorporating the programme in an academic setting, the intention was not only to give a boost to the profession of conservator-restorer on the road to emancipation and professionalization, but also to establish conservation and restoration as an independent scientific discipline.

The orientation of the educational programme is towards a scientific approach to the profession, and can be seen to be comparable with the orientation of the programme a student follows to become a doctor or a dentist. With each of these educational programmes it is crucial to combine specialist knowledge and manual dexterity with an interdisciplinary approach to the broad issues of the profession. Moreover, it is necessary to cultivate insight in, and reflection on, the scientific practice and the choices that have to be made when interfering in the materials. The team of the Conservation and restoration department (C&R) teaches the students and the ‘conservator-restorers in training’ (rio’s) to use an analytical approach which will help them develop a critical and inquisitive attitude. Curiosity combined with inventiveness are key principles.

The programme consists of three consecutive phases [table 1]: the minor, the master and the post-initial phase, each has its own didactical principle. The minor provides a condensed introduction to several aspects of the profession: conservation and restoration theory as well as the necessary skills are presented to the students, and the insights and attitudes necessary for a conservator-restorer are cultivated. During the master phase the students are confronted with all aspects of the profession within its role as a scientific discipline. The students discover and develop their manual dexterity and become aware of the central role of research at all stages of the conservation process. The goal of the master course is not to inform the students about every possible variety on a problem they could encounter in their professional career, but to teach them a methodology and a critical attitude which enables them to approach problems in conservation and restoration with a scientific attitude and from a scientific viewpoint. The students’

¹ Midterm review report, May 2010 p. 5.
capabilities for an integral approach to conservation problems with all their complexities, increases during the master. Understanding the ‘why’ and the ‘how’ of the choices they make, the actions they undertake, and the relations between the object, its context, and the scientific properties of the material, is crucial for this approach. The frame of reference they obtain enables the master students to perform the research for their master thesis with minimal supervision.

The post-initial phase (πt) prepares the conservator-restorer in training (rio) for a professional life as an academically-trained conservator-restorer. During the πt-phase the focus lies on independent work and the gaining of experience both in the treatment of objects as the undertaking of research. The first year of the πt offers the rio the chance to either develop in the broadness of the profession, or to specialize. During the internships in the second year the duality of the programme—thinking and doing—is applied in the professional field enabling the rio to develop a working routine while he is confronted with increasingly difficult assignments. These aspects eventually culminate in the writing of a πt-thesis based on a complex and complete treatment.

The fact that research is an intrinsic part of academic schooling is something we teach our students from day one of their training. Obviously the research has to be relevant for the profession and for cultural heritage and society in the broadest sense. This relevance is most prominently visible in the choice of the research questions which have a direct impact on the relevance of the results of the research. However relevant the research may be, if the findings will never leave the desk-drawer or the hard-disk of the computer, neither the profession cultural heritage, or society as a whole will benefit from its results. Visibility is therefore crucial. If people are convinced that we have a collective responsibility for our cultural heritage, then the visibility of research results is indispensable for our professional colleagues and for the keepers of cultural heritage. In order to achieve this, our alumni are the best ambassadors.

This publication defines the added value of our programme by bringing to fruition applicable knowledge for the conservation profession. Please enjoy!

Suzanne Maarschalkerweerd
Programme manager Conservation and restoration of cultural heritage
University of Amsterdam
The management of aesthetics and decay
From a UvA-C&R perspective conservation can be described as a discipline involving examination, documentation, preventive care, and research directed toward the long-term safekeeping of cultural heritage objects. In a collaborative effort with curators/technical art historians¹ and conservation scientists, the conservator-restorers² study the structure of individual objects, materials and methods of fabrication, as well as techniques and materials used in past conservation treatments. This interdisciplinary approach provides not only vital information on the makers’ original intent, but also generates knowledge of the feasibility of possible interventions and the way in which conservation treatments affect the structure and appearance of our heritage.

Conservation-Restoration
A conservator is constantly facing new and unique complex challenges, when confronted with condition assessments and eventually a treatment of cultural objects which are open to numerous interpretations and possibilities for their care. Success in caring for and preserving our multifaceted cultural heritage requires an academically trained professional who is able to perceive what the object to be cared for is, where it originates from, the context in which it was made, and the materials which were employed. Furthermore, this perception should be fused with a similarly sound knowledge and understanding of the deterioration and decay mechanisms of the materials and a variety of measures which could be implemented to preserve the object. By contextualising these qualities gleaned from each object or group of objects by means of close scrutiny with the naked eye, through the stereomicroscope or by means of various photographic techniques or advanced (preferably non-destructive) scientific analyses, and placing the results in the broader context of the material and technical development of the artist or craftsman, the conservation documentation reaches a level where the information is sufficient to serve all purposes of understanding and caring for the physical materials which constitute each object.

Conservation also embraces preventive conservation, remedial conservation and restoration. Conservation consists of indirect and direct management of aesthetics and decay.

² The document “The Conservator-Restorer: a Definition of the Profession”, adopted in 1984 by ICOM-CC and successively by ICOM, uses the term ‘conservator-restorer’ as a compromise, as the same professional is called ‘conservator’ in English-speaking countries and ‘restorer’ in those where Romanic and Germanic languages are spoken. In this text, for the sake of simplicity, the word ‘conservator’ comprises both terms and will be used throughout.
actions aiming at retarding deterioration and preventing damage by creating conditions optimal for the preservation of cultural heritage, as far as is compatible with its social use. Preventive conservation also encompasses correct handling, transport, use, storage and display, all aspects that require guidelines and procedures based on the physical behaviour and condition of the objects in question.

Restoration is strongly related to both preventive and remedial conservation and covers processes of performing changes to an object or structure with the aim of facilitating its perception, appreciation and understanding so that it will closely approximate its state at a specific time in its history, while respecting as far as possible its aesthetic, historical and physical properties.

**Objects as messengers from the past**

Conservation is also about the necessity of keeping the many-layered documentary evidence that every old or recent artistic object holds. In the future, enquiries will continue to be posed in connection with new attempts of interpreting the work, and much too often essential clues have been made incomprehensible or even removed or destroyed during treatment because their meaning and relevance went unrecognised. Examples of this are the many 16th and 17th century panel paintings that were dramatically thinned from the reverse and cradled in the 19th and 20th century. Apart from the significant side-effect of causing the panels to become even more vulnerable to environmental impact our predecessors often also removed substantial information about the production and the maker of these oak boards. My research into the panel makers and their practice in producing panels and of the impact of guild regulations on branding and marking these with their individual house marks is but one example of how significant this information may be for understanding the genesis of a panel painting.

We must realize that we only have the objects in our temporary care and will hand them over to new generations whose care-taking will be guided by their changing values. Our clients, the museum visitors and scholars alike, come increasingly from cultural backgrounds different from those in which the objects were created. Visitors may not be able to interpret objects that are more than a hundred years old, and the lack of historical knowledge amongst younger generations therefore places the effort and the role of the conservator in a crucial new context. We are approaching a situation in which conservators do not only treat and care for the objects but also serve as an important link between the objects and the public.

**Integrity of the object**

It is often true that when a conservator is considering carrying out treatment of a work of art, the first question that springs to mind is *how* to do it. The greater part of conservation research still focuses on the challenges of the physical condition of the object, the deterioration of materials and possible interventions. This question is the key issue for the conservator, arising out of the need to *keep* an object. Questions such as *what* we should preserve; *why* we choose to preserve particular objects; and for *whom* we treat the objects are challenging concepts with which a conservator may not often trouble himself.

While concentrating on the treatment of an object the conservators ought to address also the context in which the object was created, how it was passed on through history, and its current function as a bearer of culturally significant messages. I believe we need to be aware that our work is more than just a matter of preserving material and structure. Conservation also encompasses the preservation of non-tangible cultural qualities and a vast array of information. Exhibiting objects is not just a matter of putting them on display. We should be guided by an obligation and responsibility to consider what the object was, how it may have changed—and may further change. The attempt to answer these questions will naturally be influenced by the culture in which the conservator, technical art historian and conservation scientist is immersed and may be quite complex, given that cultural objects are increasingly seen as elements within an international context rooted in cultural diversity.

The crossroad between treatment (*how* and with *what*) and the visual aesthetic impact (*why* and for *whom*) is the spot where we find the conservator as manager of aesthetics and decay. Apart from dwelling on *how* to conserve or restore an object he must consistently include a consideration of the *impact* of a treatment on the recipients of the object, the viewers. An alteration of a painting’s well-known or long-appreciated message may reshape our understanding of the past. A growing degree of professionalism, coupled with our collaboration with art historians and highly specialised conservation scientists, is forcing us to realize that our impact on objects, and the various consequences, are indeed our responsibility.

**Bridging the gap between object and the public**

It is also here that we find a new and unique and crucial role of the conservator as *bridging* the gap between people and objects. Conservators at large will have a much more visible function than ever before in both today’s and tomorrow’s museums and cultural sectors, while being part of a global society which is focusing on the sustainability of our multi-cultural heritage and its materiality.
Conservation therefore appears to be much more than examination, analysis, treatment and physical care of objects but rather a profession that is becoming an increasingly active player in museum policy programming and facilities development. This leads to a function that could well be regarded as collections care, regardless of professional delimitation. Thus the act of conservation, in whatever context of collections care it takes place, appears as a matter of shared responsibility amongst many disciplines such as conservation and conservation science, curatorial work, registration, collections management, education, building and maintenance, security, in-house and external exhibition, etc. All these potential roles for the conservator within the heritage institutions each offers a potential for contributions to information and documentation about the objects in custody. Public conservation projects have been launched in several countries and prompted increasing community interest in the complexity of understanding and keeping our past for the future.

Acknowledging that documentation and conservation both are words that have been given a multitude of definitions and that offer extensive overlapping with related disciplines, from information science and management to education and research in (art) history and the natural sciences, it is important to understand that all stakeholders within the cultural sector, institutional or private, must expand their current definition of and need for conservation documentation. This definition covers photographic documentation (analogue, on x-ray films, digital etc.), drawings, schematic recordings, scientific samples and analytical charts, written texts with a narrative summary and much more.

Conservation documentation

Throughout the last century the advance of the scientific examination of works of art has completely transformed the way in which we evaluate objects. Employing an increasingly wide range of analytical tools, researchers from the fields of art history, conservation and conservation science have in many instances demonstrated the significance of working together in an interdisciplinary manner. Originally simply called ‘technical studies’ (a reference to the early Fogg Art Museum publications from the 1930s), these collaborative efforts now compose a rapidly increasing field of study described as Technical Art History.⁷

With the academically trained Master’s in conservation, museums and private customers are offered a most spectacular academic orchestration, conservators being able to assess the objects in a scholarly manner as well as mastering the complicated craft of treating them. The most challenging (art) historical and scientific developments in the understanding of our cultural heritage are taking place at interdisciplinary interfaces combining the research of curators, conservators and conservation scientists. In a growing number of museums this staff partnership has taught us to appreciate the mass of information gleaned from pooling the resources of this variety of disciplines.

Collaborative interdisciplinary projects with participants from both the humanities and the natural sciences (art historians, historians, conservators and conservation scientists) can repair the misconception that these disciplines counteract each other, and actually function as a torch of light for others.

Research

Above we have stressed that the conservation and preservation of cultural heritage is an interdisciplinary field requiring close cooperation between conservators, archaeologists, (art) historians, collection managers and museum curators on the one hand, and conservation scientists on the other. It is broadly recognized that the scientific analysis of materials contributes essential, and often indispensable, information to the comprehension, preservation and restoration of objects of cultural heritage. The analysis of inorganic materials such as pigments, minerals, stone, glass and metals, can be carried out reliably by a range of methods. So while the natural sciences, as well as engineering, play a critical role in the proper selection of conservation materials, methods and strategies, scientific research in conservation is often conducted by scientists who originally come from outside the cultural heritage field. These scientists thus lack the affinity with the cultural heritage and conservation fields necessary to fully understand and communicate the significance, but also the consequences of their work, to non-technical colleagues. It can thus convincingly be argued that parallel to the UvA education in Conservation & Restoration (c&R), complementary education in Conservation Science (cS) and Technical Art History (tAH) will complete the notion of

institutions, museums and universities and the industries, often offers opportunities for new results and innovation. Fundraising in collaboration and for interdisciplinary projects has a much better chance of success.

**Conclusion**

‘Scientific conservation’ is based on the assumptions that 1) the principal aim of conservation is to preserve the integrity of the object, and that 2) this integrity is located in the object’s physical features and constituents. Therefore conservation should involve scientific research into the work’s ‘true identity’ through the investigation of the material properties of the original object. These are the properties that should be preserved for the future or that one should strive at reclaiming by means of restoration. Preservation and restoration practice should, furthermore, minimize intervention and aim at avoiding, as much as possible, measures that cannot be reversed.

In many museums research-curators conduct their studies on a high level of sophistication. The same could be said about research-conservators; a job description until now not often encountered in the museum world. Conservation scientists, found only in a few museums, will be expected to carry out research in order to understand the how of objects and in order to come up with solutions to their safekeeping. The balance between a continued focus on developing and exercising hands-on treatments with educating an academically trained conservator in tandem with training technical art historians and conservation scientists should be seen as a novel and important trinity aiming to create a strong interdisciplinary team caring for Collectie Nederland – and beyond.

It is in this complex interaction between a multitude of stakeholders, the technical art historian-conservation scientist-conservator being a unique trinity, that the UvA-C&R educates and researches for the benefit of understanding and keeping objects of our diverse yet common cultural of objects as mirrors of human expression for current and future generations.

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*a trinity* that, in collaboration, can research, understand and care for our historical past, its aesthetics and decay.

We have an urge to make our conservation research relevant to others both within and outside the heritage world. With open-access databases to assist in spreading the meta-data of research achievements comparable to that of the INCCA network and the rising importance of the RKD databases on technical documentation. Contemporary artists are highly experimental in their use of materials—often to such a degree that the deployment of fragile, ephemeral, degradable, and period-specific materials has become a prominent characteristic of the art of today. As a result, several art objects of the latest decades no longer exist in their original form: they have either degraded severely, are in the process of change and decay, or have been entirely or partly remade in more recent forms of their original materials.

Collaborative projects between universities and (regional) museums could facilitate better research infrastructures instigating shared databases or research documentation programs.⁸ Such constructions may assist museums and collections in answering questions like how we keep funding the conservation documentation, i.e. C&R, CS and TAH collaboration, in its broadest sense when museums are constantly being put under economical pressure from governments. Collaboration between different

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⁸ See the open source Mellon funded ConservationSpace project: [www.conservationspace.org](http://www.conservationspace.org)
Norman Tennent

Conservation science ... or science for conservation?
Conservation science ... or science for conservation?

[Norman H. Tennent] The previous article sets out our University of Amsterdam Conservation and Restoration (UvA C&R) credo for conservation and in so doing acknowledges to the increasing sophistication of the field in terms of the technological developments and the increasing multi-disciplinarity which the academic education of conservator-restorers must embrace. One aspect of this is the need for an ever-stronger scientific foundation on which conservation practice must be based. In this essay, I wish to chart some key aspects of the discipline of conservation science with which conservator-restorers must become conversant. Conservation science is a very young academic field of study whose potential contribution to conservation has never been greater, but to fulfil its potential the scope of conservation science must be driven by the needs of conservation. I wish, therefore, also to allude to the dangers of conservation science losing sight of the importance of contributing directly to conservation practice. An analogy of the dangers faced by conservation science was formulated by Gael de Guichen, a scientist whose awareness of the needs of conservation is second to none. He pointed out, amusingly and not entirely inaccurately, that there is the tendency for conservation scientists to resemble satellites launched into space with a specific purpose but which stray from their path while continuing to send ever more unintelligible messages back to earth.¹ That danger will be one of the themes being discussed in Rome this year at an international forum on conservation science, to which I shall return below.

Conservation science within the UvA C&R programme is, in actuality, better referred to as ‘science for conservation’. Indeed this description parallels the running title of a groundbreaking series of textbooks, Science for Conservators, first produced in the 1980s and still used at UvA and elsewhere as science teaching primers. The fundamentals of science gained in the three phases of our programme are designed to give graduates sufficient scientific grounding to undertake sophisticated diagnosis of conservation problems, carry out treatments and, if necessary, initiate further scientific investigation. The goal is to provide the necessary scientific ‘toolkit’ which will underpin not only the expert execution of treatments but also the provision of well-grounded advice on technical examination, storage, display, handling, and maintenance of cultural heritage.

To achieve this goal our programme recognises that science has a central role in understanding the materials which constitute art and antiquities and is the basis for a proper appreciation of technical aspects of their creation. Indeed, scientists have undertaken analyses of cultural heritage since the beginning of experimental scientific endeavour as we now know it, in the 18th century. However, the role of science in contributing to
heritage conservation and restoration is much more recent. The first museum laboratory founded at the end of the 19th century but it was not till the 1960s that the discipline of conservation science emerged as a distinct field of applied science and it was even later, in the 1970s, that the term conservation scientist began to be used in conjunction with the preservation of cultural heritage. Since then, the subject has been evolving rapidly and there have been regular attempts to define its scope in published texts.¹ ² ³ A landmark international gathering of conservation scientists, held in Bologna in 1999, specified⁴ the principal roles of conservation science as: study, investigation and monitoring of cultural heritage and its environment with respect to conservation and preservation; definition, development and evaluation of conservation concepts, materials, measures, methods and techniques and the development of standards and guidelines; provision of diagnosis before, during and after conservation interventions; research on the causes and mechanisms of deterioration and the interpretation of scientific results for the benefit of conservation of cultural heritage; communication of the scientific principles of conservation and the promotion of scientific research in conservation; cooperation with other disciplines.

At UvA, our teaching and research recognises the importance of a strong scientific basis for optimal conservation in the 21st century while nonetheless accepting that the scientific knowledge for a comprehensive underpinning of conservation practice is vast. Ultimately, this is best developed in the workplace by partnerships between conservator-restorers and scientists tackling conservation projects in a symbiotic relationship. We are fortunate that this close cooperation with conservation scientists commences at the outset and continues throughout our 5-year programme. In the ‘Ateliergebouw’, the superb conservation centre which we share with scientists from the Dutch Cultural Heritage Agency (RCE) and colleagues from the Rijksmuseum (RMA), the sharing of expertise with conservation scientists and conservation practitioners infuses both teaching and research. Examples of projects given in this essay will demonstrate how the Ateliergebouw allows easy integration of scientific analysis and experimentation as support for student conservation treatments or research projects (in both the Master’s and Post-Initial phases) and for staff research. This involves primarily access to state-of-the art instrumental analysis but no less relevant is the need for accelerated aging facilities to predict the long-term behaviour of conservation materials. It is no coincidence that the UvA classroom lessons on analytical techniques are greatly enhanced by the access to the instrumentation itself, combined with the experience of the analytical scientists, which the Ateliergebouw, through the close working relationship with the RCE and RMA, provides.

The development of the discipline of conservation science needs to be written; indeed, the history of conservation science in The Netherlands alone remains, as yet, by no means fully documented. Karin Groen has demonstrated⁵ how revelatory the details of that task would turn out to be. Since the establishment of the Centraal Laboratorium voor Onderzoek van Voorwerpen van Kunst en Wetenschap (Central Research Laboratory for Objects of Art and Science) 50 years ago, on 1st March 1963, The Netherlands has played a leading international role in the development and practice of conservation science. In her survey of national and international progress in conservation science, Karin Groen makes many telling points which deserve to be more widely known and discussed. One key issue is; “does the research have consequences for the restoration?” She cites the example of the degradation of the yellow pigment, cadmium sulfide. Despite much new information on the ensuing colour changes (gained using the most sophisticated analytical facilities, including


[plate 1] Detail of Zeegezicht, an oil painting from 1909 by Piet Mondrian, in which the unstable cadmium yellow paint is showing cracks and is lifting. Several paintings by Mondrian exhibit a similar appearance; the yellow paint has a strong craquelure and some discoloration.
a large proportion of the marble tympanum now actually consists of this material. Interestingly, its durability, after a century, has been shown to be remarkably good. Consequently, the research takes the 1915 tympanum repairs as the starting point to explore the scope for rehabilitation of this material, currently not used in The Netherlands, in the expectation that a versatile material, first prepared in the 19th century⁵ and formerly used for filling dental cavities (a rather different form of conservation), may have great potential for the future conservation treatments.

This case study is an example of one of the aspects of conservation science—the prediction of long-term durability—which requires input from conservator-restorers. The natural aging of the old tympanum repairs is a century-long experiment and its documentation by conservator-restorers contributes to our understanding of durability. Conservation requires, however, predictions of the durability of new materials and the science of natural and accelerated aging is one of the key facets of conservation research on which our programme focuses. Here the RCE accelerated aging apparatus, especially for light fading, is a crucial part of our C&R experimental requirements, available nowhere else within UvA. The need for acceleration of long-term behaviour requires a thorough understanding of the relevant parameters and a rigorous implementation of them. The state-of-the-art Ateliergebouw facilities therefore provide an exceptional opportunity for student and staff research on long term behaviour of artists’ and conservation materials. Nonetheless, accelerated aging is no substitute for the results of natural aging. For this, considerable planning and patience is required but its value is clearly demonstrated by the illustration [plate 3]. In 1967, panels of 40 different calcareous stones

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(24 of which are shown in this illustration), all used for building facades, were installed outdoors in a test wall in a rural site in Belgium. The lateral sections were treated with silicone resins and the central section left untreated. After more than thirty years, the relative effectiveness of the stone treatments and the different response of the various stone types to the waterproofing is clearly visible, an experiment which is more convincing than any attempt to accelerate the process. The limitations of science, as well as its possibilities, is a recurring theme in all science for conservation.

The assessment of durability is one of the unique contributions of conservation science to the understanding of the chemical and physical changes which affect materials. In many cases knowledge of materials such as adhesives or varnishes is being gained which goes well beyond the information available from the manufacturers or in publications of scientists in academia. However, nowadays it seems that conservation science places a rather low priority on materials and treatment. This fact is demonstrated by the pie chart in plate 4. This sort of information has previously not been available but is one of the outcomes of the data being gathered for the 2013 ICCROM Conservation Science Forum in which UvA will participate in conjunction with RCE, as partners in an international event which seeks to be a defining moment in current state of development and future priorities of the discipline.

The difficulties of scientific research to develop conservation treatment methods have long been recognised. The situation was well described in 1982 by the late Giorgio Torraca, an Italian conservation scientist whose understanding of conservation and the needs of conservator-restorers was second to none. Torraca surveyed the role of conservation scientists in an article⁶ which should be essential reading for all conservator-restorers and conservation scientists. His survey recounts an inauspicious start as he describes the moment in 1818 when the renowned English scientist Sir Humphrey Davy conducted experiments to unroll charred papyrus scrolls from Herculaneum with the result that “one of the first recorded attempts of scientists to meddle with the conservation of antiquities was a complete failure”. Torraca held the view that conservation science in the 1980s had deviated from its primary task, to assist conservator-restorers in preventive and practical treatments. He pointed out that reluctance on the part of scientists to be involved in conservation practice often had the consequence that conservator-restorers were compelled to take over all the testing procedures involving experimentation, application and evaluation of results. Provocatively, Torraca commented that “Occasionally conservator-restorers mask the lack of scientific grounding of their efforts by contact with some friendly scientist who offers some amateur collaboration. The scanty and usually irrelevant results of such collaboration are proudly displayed in reports and exhibitions to guarantee the scientific level of the work done, on which they had no influence whatsoever.”

This is precisely the situation which the UvA c&r education in science for conservation seeks to consign to the past. Building on conservator-restorers’ increased competence as a result of the role of academic training in conservation, especially in the last three decades, it is clear that an equal dialogue between conservator-restorers and scientists becomes the norm and, furthermore, that the necessity for embracing art history ensures a true colloquy of not two but three interconnected disciplines.

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Abstracts of both Master’s- and post-Master’s-theses
Klein maar fijn

Lead white in fine particle size

[Marya Albrecht] This thesis focused on gaining more insight into the use of lead white of fine particle size in Dutch paintings of the 17th century, with the main question being the reason why painters used this very fine grade of lead white. In order to be able to answer this question, the available literature was studied and reconstructions based on historical recipes were carried out.

By combining knowledge of paint behavior with practical experience gained by carrying out reconstructions, the specific properties of linseed oil paint in which fine or coarse lead white particles are dispersed became clear. Various series of reconstructions were designed, and carried out, to deal with specific aspects of the working or optical properties of the paint. The reconstructions have been examined by taking cross sections and analyzing them with optical microscopy and SEM.

These techniques were also used to analyze cross-sections of several 17th century paintings that probably contain fine lead white, amongst others Portrait of Hylck van Eysinga by Wybrand de Geest and Still Life with Flowers on a Marble Tabletop by Rachel Ruysch.

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The construction and conservation of movable books

A case-study of the Meggendorfer-Collection at the ‘Bijzondere Collecties’, Amsterdam

[Sanne van Bergenhenegouwen] This research includes a discussion of the construction of movable books, largely based on the use of a case-study: the Meggendorfer-Collection at the BC, UvA in Amsterdam. Included in this paper is a small terminology, designed to make discussion of the subject easier and as unambiguous as possible. Attention is given to the construction of the text-block, the paper used for the text-block, the design of the mechanisms and the construction of the cover. Some research has been done concerning the materials used for the paper by means of fiber determination under the microscope. Distinction has been made between seven types of mechanisms. A large part of the thesis is concerned with the discussion of specific types of damage that occur in relation to the movable book. This is divided into: damage to the text-block, damage to the mechanisms and damage to the cover. A distinction has also been made between mechanical damage, damage caused by the construction of the book, previous destructive restorations and natural damage. A separate chapter is dedicated to the damage that is unique to the Meggendorfer-Collection at the BC in Amsterdam. Several suggestions are given concerning the treatment of the most frequently occurring types of damage. A treatment proposal is given for the Meggendorfer-Collection, with special attention to the ethics concerning treatment of the several restorative operations performed by the former owner of the collection, prof. Wagenaar. These are for a large part responsible for the unique character of the collection and should not be easily rejected. Care has to be taken to preserve them, in light of the historical and cultural importance of these treatments.

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A paper on this work is in preparation
**Shining a light on UV-adhesives**

A research on the aging of four UV adhesives in the field of glass

**Nienke Besijn** In the 1970s a new type of adhesive was introduced that potentially could change the field of glass restoration forever: ultraviolet light curing adhesive, also called UV adhesive. It has the ability to set quickly which makes it more efficient than other adhesives used in glass conservation-restoration. Now, 40 years later, the UV adhesives have only sporadically been researched, and do seem to be applied often.

This study presents research on the history of UV curing adhesives in glass conservation-restoration and how it is used today. With the help of restorers who regularly use UV adhesive, four adhesives were selected for further analysis: UV901 and UV902 (Sylmasta®), Conloc 665® (EGO) and Locite 350® (Henkel). These adhesives were tested on their applicability and reversibility on stable clear colourless glass. These tests were performed on broken microscope slides and wine glasses. The adhesives were artificially aged by means of light aging equivalent to 100 years of aging in museum conditions.

The applicability tests showed that all adhesives were applicable on glass that is stable, clear and colourless. The most positive results in this test were achieved with Conloc 665. The results of the tests for reversibility of the UV adhesives before aging showed that the UV adhesives were removable using methylene chloride. After the artificial aging of the adhesives the degree of yellowing was measured optically and spectrophotometrically. The overall results of the tested UV adhesives showed no noteworthy yellowing, and the UV901 and UV902 showed no optical yellowing at all. The results of the spectrophotometric measurement also confirmed that the UV adhesives showed only minimal yellowing. The reversibility tests on the aged adhesives showed that all four aged UV adhesives were removable with methylene chloride. The aged adhesives were generally easy to remove, as opposed to the recently cured adhesives. Applying acetone to the aged adhesives resulted in blistering and stickiness, unlike the non-aged UV adhesives.

This research shows that the use of UV adhesives on stable colourless glass definitely has potential. The working time can be significantly reduced and there does not seem to be any harmful long term effects on stable colourless glass. Further research on different types of UV-curing adhesives and the effect of these adhesives in other aspects of glass conservation-restoration is recommended.

**The hand of a master**

Art-technical research into the painting technique of Jacob Adriensz Backer (1608/9-1651)

**Julia Maria van den Burg** Jacob Backer was a contemporary of Rembrandt, and of whom it was said he could paint a portrait in one day. Until now, sporadic technical research has been done on works by Backer, often within the framework of other research projects. Little research has focussed solely on Backer and his painting techniques. This thesis studies a number of aspects of Backer’s painting techniques and working methods and places him in the context of his fellow 17th century painters.

This thesis was written for the pilot Rembrandt Students Project, conjointly run by the RMA, the UvA and the RCE. Twelve paintings from different periods in Backer’s career (early, middle and late) and with different subject matters and sizes (large group portraits and smaller individual portraits) from the RMA, the MDh and the AM were studied in-depth with various techniques including visual analysis, IRR imaging, x-radiography, cross-section analysis, SEM-EDX and thread counting. Conclusions were drawn regarding the supports Backer used, the types of grounds he painted on and the extent to which he used these grounds in his final painted image, his use of preliminary drawings and undermodelling, his painting technique and the development of his style throughout his career, and the types of pigments used.

It was found that Backer used panels and canvases for smaller individual portraits and canvases for larger group portraits and classical and mythological scenes. Toward the end of his career it appears that Backer only painted on canvas, possibly following the 17th century trend which saw a rise in popularity of canvas as a support.
Backer’s paintings reveal a traditional and economic working-up of the paint layers. His brushwork became looser and bolder as his career progressed and in the faces and hands of the portrayed his brushwork contributes to their plasticity.

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Conservation dilemmas regarding painted alterations to portraits which are of historic value

[Melissa Esther Daugherty] This Master thesis focuses on problems around conservation-restoration methods used on 17th century paintings that have been altered in the course of time – with the emphasis on alterations that affect the historical identification of the portrayed. The conducted research centers upon two paintings from the collection of the AM, portraits of Pieter de Graeff and Jacoba Bicker both painted by Wallerant Vaillant. The lead question is how to reach an objectively substantiated decision regarding which stage in its history the painting should be conserved to. The conservation-restoration process of both portraits is documented in this thesis.

Using different methods of research (conservation documentation, interviews with experts in this field, historic sources) and technical analyses of the paintings’ layer structure, more insight was gained into the time frame and order of the various alterations. The conclusion from these various forms of research is that a single answer to the lead question cannot be given. The preferred conservation-restoration method of alterations depends on many different aspects. Therefore, reserved and reversible conservation-restoration methods should always be preferred. They will allow future conservator-restorers to make different decisions regarding the conservation-restoration of these painted alterations.

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The paint box of Breitner and the colours of Standage

This study discusses Breitner’s paint box from the collection of the AM (inv. nr. KA14285), which has not been described previously. The research project focused on the influence that “The artists’ manual of pigments” published in 1886 and written by H.C. Standage might have had on the artist George Hendrik Breitner (1857-1923). Breitner made a note of this manual’s title in his sketchbook around the date of publication, but did the artist take the writer’s advice? The aim was to gather knowledge on the object in its historical context, the artist’s use of pigments and on 20th century oil paint. The study was undertaken as a joint project by the UvA and the RCE.

The paint box was documented and samples were taken from the tubes and palette within. Letters, notebooks and sketchbooks of the artist were consulted to gather information on the use of the box and paint. The findings indicate that the painter used and filled the paint box between 1897 and 1923. Shopping lists and names of colours as noted in the artist’s black and white sketches reveal Breitner’s interest in new colours. This impression is confirmed by the diversity of the 58 paint tubes in the box. The paint comes from at least seven different colourmen. The majority is labeled Claus & Fritz. Paint fabricated by this firm was considered to be of a high standard and fine quality.

In his manual Standage describes pigments from a chemical point of view. The author is an outspoken opponent of lead-containing pigments on the palette. In this respect he distinguishes himself from contemporary authors like the painter Vibert and the paint maker Keim who wrote about pigments. In the opinion of Standage lead white is destructive. He presents the combination of chromium yellow and cadmium yellow to demonstrate the adverse consequences of the interaction between sulphur and lead.

In total 48 paint samples were taken from the paint box. These were analyzed using complementary techniques: light microscopy and polarization microscopy, SEM-EDX, XRF, FTIR, GC-MS and HPLC. The results show that the colours in the tubes are composed of 20 different pigments, in various combinations.

A few case studies were carried out that established some proof for the relationship between Breitner and the tube paints. Results of XRF analysis on several paintings dating past 1897 could be related to specific combinations of pigments in the tubes. These included some of the unstable mixtures described by Standage. Lead white was identified in all paintings examined.

Breitner could have been unaware of the risky combinations in his paint tubes. Standage did not describe the particular fanciful names of paints like Zinnober. Yet he clearly described the potential destructiveness of lead white. Breitner consciously chose to paint with it, neglecting the advice of a theorist.

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A paper describing this work has been accepted for publication¹


Paint box of George Hendrik Breitner (1857-1923), collection Amsterdam Museum. (inventory nr. KA14258), 44,5x34,5x8 cm
Light causes damage to materials, and therefore it forms a dilemma for museums and other institutions that manage collections when they wish to exhibit their collections. Guidelines for the exhibition of objects have been formulated in the past in order to restrict damage caused by light as much as possible. These guidelines are based on the sensitivity of an object in relation to luminosity and exposure time.

The sensitivity of an object is determined by an ISO classification known as the ‘blue wool standard’. The limitation of this classification in sensitivity classes is that objects are classified based on the type of object. Work on paper with coloured media is classified as ISO 1, very light sensitive. The classification does not consider the various components of an object and how these components change under the influence of light. There is no knowledge about the effects of various changes in these individual components to the appearance of an object as a whole. As a consequence, the classification in sensitivity classes only presents a general picture. The sensitivity of specific objects may therefore be overestimated or underestimated.

In order to obtain a better understanding of the damage caused by light, a study was conducted into the effects of light aging on the appearance of works of art on paper with coloured media. Reconstructions of three typical objects were made: a watercolour painting, an ink drawing, and a piece of wallpaper. The reconstructions were exposed to light over a period of seven weeks with an actual total exposure time of 830 hours at an average of 11,000 lux. The objects were scanned, and colour measurements were taken every 24 hours. A theoretical model was developed based on the current guidelines for exhibiting collections, as formulated by the ICN. The results of the scans and colour measurements were analysed and compared to the theoretical model, and led to the conclusion that for objects in the category ‘work on paper with coloured media’ a closer look at light aging is required.

Such objects do not respond to light aging as single entities. Dilution of the medium and the existence of layers of media are two aspects that play a role in light aging. A third very important element is the role of a dye or pigment within the composition of the object.

Furthermore, the investigation revealed that the theoretical model is not adequate for determining the sensitivity to light and possible damage to the object because the model ignores light-sensitive variations in the objects.

Further research could lead to refinement or modification of the current model. The basis of this model would no longer be the ISO classification based on an object group, but on the different components of an object and the mutual coherence of these components. An evaluation of each part of an object should form the basis for the determination of the risk of light damage per item. The light sensitivity of the most important components of the object would then form the basis for determining the ISO rating.

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*http://dare.uva.nl/document/478509 (21-03-2013).*
**A study of 18th century furniture locks**

[Auke Gerrits] In the discipline of wood/furniture conservation-restoration, a conservator-restorer frequently encounters materials that cannot be categorized as wood, but still sometimes require special attention in a conservation-restoration process. Furniture locks are prime examples of such materials. Furniture locks can contain important clues with respect to dating and the country/region in which the object has been manufactured. Next to this, one can also question the authenticity of a certain lock on a piece of furniture. The metal lock is a key point of attention, for the following reasons:
- locks can be worn out (replacement/restoration of parts may be important);
- locks may have been replaced or removed (the authentic configuration has disappeared);
- the lock has to be conserved.

In spite of their importance, furniture locks are an area in which little research has been done. The characteristics of various locks from various periods in history are only sporadically found in literature but have not been subject of a systematic investigation. As a result, it is very difficult to establish if an object is authentic or not. Also, metal parts like furniture locks are often sent to a conservator-restorer specialized in metals. Obviously, if the knowledge of the metal components would assembled and suitably organized, a specialized furniture conservator-restorer would be able to carry out a restoration on his own, and to establish whether a lock configuration is authentic or not.

For these reasons it was decided to assemble and organize systematically all information about the most common locks on furniture that a specialized wood/furniture conservator-restorer regularly may encounter.

A documentation system has been set up, including drawings and technical specifications of all 18th century furniture locks, the materials, tools and techniques that were used to manufacture them, and the techniques and materials used to attach the locks to the furniture. This system allows the selection of an appropriate lock for a piece of furniture at which a lock is missing, or to make a copy of the lock.

Also, an authenticity justification procedure has been set up, based on the applied lock-manufacturing techniques, and traces of manufacturing tools and attachment material on furniture.

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R. Kievits (RCE), P. van Duin (RMA)

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**Finishes on furniture 1800-1900**

Reconstructions of 19th century finishes on the basis of contemporary sources

[Sophie Glerum] Although a wide variety of varnishes and coatings has been used in the 19th century, we nowadays are mostly familiar with the appearance of a shellac based French polish or a wax coating, being the coatings that have been used in conservation-restoration for the last hundred years. To obtain better knowledge on the coatings which were available during the 19th century, research has been carried out regarding the recipes and instructions appearing in Dutch, French, German and English written sources from the period 1800-1900. During the selection process only the recipes and instructions were selected that dealt explicitly with the finishing of furniture or wooden objects.

Based on the information that was found during this research, twelve coatings were selected and reconstructed according to the original recipes in order to get an idea of their original appearance. These coatings were prepared according to the found recipes and were applied according to the original instructions to test samples of mahogany veneered multiplex of 24 × 40 cm.

The tests also included the possible effect of two often applied pre-coating wood preparation techniques, addition of a layer of a) diluted glue size or b) drying linseed oil. After the coatings were applied and finished an impression was obtained of the intended appearance of the original coatings and the way in which they differ from the coatings we are used to see nowadays.

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In the 19th century a large amount of frames was made out of ‘composition’, a dough-like material that consists mainly out of chalk, glue, linseed oil and a filler such as saw-dust or paper. This blend of materials was pressed into a mould to form ornaments which were glued on the frame. Finally, the frames were completely gilded. Due to the popularity of these frames and the increasing industrialization, there was a large production of composition frames in the second half of the 19th century.

Nineteenth century composition frames have been analyzed mainly from an art-historical point of view, focusing on function, style, type and the development of various types of frames. The gilding of these frames has not yet been investigated extensively, and this applies in particular to gilded composition frames that were made in The Netherlands. For this reason, research was started to gain more insight into the 19th century Dutch gilding techniques, using five 19th century composition frames from the RMT (Enschede, The Netherlands) as a case study.

To verify expectations concerning the type of gilding used and the layer structure of the gilding, Dutch, English and German historical sources from the second half of the 19th century were analyzed for specific regulations and prescriptions for the gilding of the frames. Cross sections of the five above-mentioned composition frames were taken and analyzed with light microscopy, and later on with FTIR and SEM-EDS to identify organic and inorganic materials, respectively.

The relatively small number of historical sources and frames that has been studied in combination with and the limited technical data do not allow yet a definite conclusion concerning gilding practices in the 19th century in The Netherlands, but it has become clear that both historical recipes and technical analyses are needed in order to avoid premature conclusions.

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Original gilding on nineteenth century composition frames
Research on historical gilding techniques

[Tess Graafland] In the 19th century a large amount of frames was made out of ‘composition’, a dough-like material that consists mainly out of chalk, glue, linseed oil and a filler such as saw-dust or paper. This blend of materials was pressed into a mould to form ornaments which were glued on the frame. Finally, the frames were completely gilded. Due to the popularity of these frames and the increasing industrialization, there was a large production of composition frames in the second half of the 19th century.

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Rijksmuseum Twenthe (RMT), G. Kingma (RMT), H. Baija (RMA), K. Keune (RCE), J. van Iperen (RMA)
Organic moulding material in lost wax casting in 16th century Italy

In his 1568 publication Giorgio Vasari claimed that founders who used the lost wax method were able to cast bronze statues so perfectly that these statues did not need any correction of casting defects once they were cast. This was the main reason to focus on the moulding materials used in lost wax castings in 16th century Italy. The main component of these mould materials was clay. The lost wax method for casting bronzes is still in use today. Onto a wax model a sprue, feeding channels (runners) and venting channels are placed, and covered with a heat-resisting moulding material. By heating the mould the wax is removed. Subsequently, the mould is fired after which the bronze is poured into the cavity of the mould. Finally the mould is broken into pieces, and casting defects, if any, can be corrected. When casting bigger objects, which have to be casted hollow, an inner core is used.

Not a lot of recent research on Renaissance moulding materials is known to exist.

The main two recent sources of information are that of Francesca Bewer and Jane Basset. Within this thesis the focus is in particular on the main Italian sources: Biringuccio, Cellini, Gauricus and Vasari. The main moulding material used by them is earth containing clay, mixed with wool-cloth clippings. Other additives named by various authors are: horse or cow manure, hair, hemp, flax, straw, crushed brick, ashes, sand, salt water, iron scale, ashes of young ram’s horn and plaster. The two most important sources are the publications of Biringuccio and Cellini. They go into greater detail describing the earthy clay they use as main moulding material. The descriptions by Cellini are even more valuable because he reports relative proportions of the materials used and gives a detailed account on how to use them. The main components clay/earth and wool-cloth clippings have been studied in more detail. It can be concluded that several authors were not quite accurate in their translations and interpretations of these main components. Modern standardization allows for a more precise definition of the various terms for clay, earth, loam and sand.

As to the experimental side of the research, a few small tests were carried out with moulding material based on clay with one or more additives. River clay mixed with wool fibres resulted in an inadequate outcome. A loam-mixture of sand, clay, goat hair, horse manure and reclaim, obtained from the Whitechapel Bell Foundry London UK, delivered good castings. These equalled casting results made with modern day moulding materials. In order to get a perfect cast the moulding material is most important but many other factors influence the outcome, e.g. the composition and temperature of the alloy, the process of firing the mould and the craftsmanship of the foundry men. Concluding: casting bronze statues so perfectly that they do not require any correction of casting defects is possible but only under ideal circumstances.

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The toxicity of the pigment orpiment in historic interiors

Anyone that handles old, deteriorating paint layers, e.g. conservator-restorers and museum employees, must always consider the possibility that on the surface of the paint toxic pigment particles can be present that may come loose when being handled. An inspection of the condition of deteriorating paint layers, and detection of potentially toxic materials on the surface, should be carried out before any treatment.

Recently, two deteriorating painted ceilings in a 17th century monument in Hoorn (The Netherlands) have been examined. In the paint on both ceilings orpiment (arsenic sulfide, As₂S₃) and its toxic oxidation product (arsenic oxide, As₂O₃) have been identified using PLM. The presence of arsenic has been confirmed with XRF.

The toxicity of orpiment is known since antiquity, due to the highly toxic element arsenic. The precise hazards of the presence of orpiment and arsenic oxide both to the conservator-restorer of the ceilings and the resident of the monument were unclear and therefore two experiments were carried out.

An indication of the risk for the conservator-restorer has been obtained by measuring the exposure to arsenic in inhalable dust during an 8-hour experiment. In this experiment the overpainting on one of the ceilings was mechanically removed using a scalpel. During this experiment a special gas mask with a filter was worn. Afterwards, the contents of the filter were analyzed with inductively coupled plasma mass spectrometry (ICP-MS). The ICP-MS results indicate a presence of arsenic in air that exceeds the threshold limits of several European countries.

The risk for the resident has been assessed by examining the condition of the unvarnished paint surfaces, the migration of arsenic in the paint layers and the wooden substrate (using SEM) and the detection of arsenic particles in dust (XRF).

Several measures are recommended to reduce exposure, such as improved ventilation, shorter working hours per person, the development of a different removal method and the use of appropriate protective equipment. During hands-on work, contact with inhalable dust must be avoided as much as possible. A protocol has been established for the handling of paint layers in historic interiors or on historic objects that might contain toxic pigments.

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Coal tar as a painter’s material
A material-historic study of a 19th century coal tar paint on the organ case in the Westerkerk in Enkhuizen

[Annemiek Heuft] In February 2011 the restoration of the large organ of the Westerkerk in Enkhuizen was completed. Architectural paint research on the wooden case had uncovered remains of an original finish from 1549 and a 17th century painted decoration under the current black-and-gold exterior dating from 1838. After analyzing the black paint it appeared to be composed of coal tar in linseed oil and colophony resin. Continuing on the restoration, this thesis is a study of this coal tar paint, its material-technical context and the historical usage of coal tar as an ingredient for paints applied by house and furniture painters in the 19th century.

Coal tar is a ‘bituminous material’ and has been put in relation to asphalt. Since the 18th century it was gained as a by-product in the carbonization of coal to make cokes. Studying 18th, 19th and early 20th century housepainters manuals and recipe books, it appears that bituminous materials like asphalt, tars and pitches have been used in enamel paints, varnishes and lacquers for a variety of objects. Coal tar was also regularly used as a protective layer on coarse wood exposed to water, particularly in the ship-building industry. Because of its wide availability it has been frequently sold as a cheap substitute for the natural asphalt that had to be imported from the Middle East. This has had its consequences for the paints made with the cheaper material. Scientific research has suggested that coal tar has an even greater influence on the drying of linseed oil than asphalt, and that paints made with coal tar dry very slowly or never at all. Despite of this the coal tar paint on the organ case in Enkhuizen has aged quite well, although the slow drying has been responsible for the formation of drying cracks in the gilded decorations applied on top of the black paint.

Why it was decided to use coal tar on the organ case in Enkhuizen could not be made absolutely clear, but it probably will be related to its deep color and delicate gloss.

Although the historic sources suggest that bituminous materials have regularly been used as a painting ingredient on other objects than paintings, other painted finishings comparable to the one on this organ have not been found during this research project. Possibly other bituminous paint layers on objects have not been preserved, or other black paints consisting of these materials have not been identified before. Black was used more often in interior decoration around 1838, mostly to imitate Japanese or Chinese lacquer panels on the walls, and black furniture in one’s interior was considered distinguished and genteel in 19th century Holland. The gentility of the color black in the Dutch organ tradition was primarily popular for the more conservative organs and applied by a few specific organ-builders in the protestant reformed communities in the northern provinces of The Netherlands: Groningen, Friesland and the north of Noord-Holland. In these regions the use of coal tar could be connected to ship-building, or to a traditional paint recipe of a specific painter or organ-builder.

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Go with the glow  
Treatment options for a work of art with a phosphorescent paint layer

[Ellen Jansen] Phosphorescence is a complicated phenomenon. It is a form of photoluminescence that is associated with electrons in a triplet-state. This means that the spin of the excited electron changes and therefore it returns slow(er) to an available lower-energy orbital. When returning the electron releases energy that we observe as light. Since this is a process that takes a long time, the phosphorescing object continues to glow in the dark.

The phosphorescence in art materials is achieved by pigments. For this, mostly phosphor zinc sulphide and rare earth pigments are used. Both type of pigments have different characteristics, but comparable degradation symptoms when exposed to uv-radiation, water and acids. When the pigments are used in phosphorescing paints, the phosphorescent pigment, the medium, the pre-treatment of the pigment and the filling materials determine the characteristics of the paint. The information that the manufacturers release about the mixing of phosphorescent paint was combined with results from practice-oriented research. This helped to create more understanding about the characteristics of phosphorescent paint and how it can be manipulated for our own purposes.

From the 1960s onwards, ‘stable’ phosphorescent art materials are available and many (known) artists have used them. The artwork Without Title (1968) by Rainer ‘tnt’ Giese (Neheim-Hüsten, 1942-1974) from the collection Depot vB / vR of the RMt (Enschede, The Netherlands) is an example of a phosphorescent artwork. It consists of two beams painted with yellow phosphorescent Wiedelux paint. In daylight the paint looks yellow and in the dark it has a yellow-green afterglow.

Over the years, slowly a discrepancy has arisen between the original idea of the artist and the condition of the artwork. Giese created rigid geometric forms that give the illusion of a large spaciousness because of the phosphorescent finish. On the surface several damages can be recognized that hinder the phosphorescence of the artwork and can be seen in the dark as black spots. A conservation strategy was conceived for each specific damaged area. The retouching of the lacunae in the phosphorescent paint layer proved to be the biggest challenge.

Technical analysis determined that the original phosphorescent paint layer was cadmium based. Since cadmium cannot be used anymore for the production of phosphorescent pigments because of health and safety regulations, the materials that are available on the market now have different properties than the material that Giese used. Therefore, it was necessary to try to manipulate the phosphorescent pigments and paints to find a suitable retouching medium.

Practical and technical tests where carried out to find a retouching medium that resembles the original paint layer in daylight and also has a comparable emission spectrum.

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Reconstruction of ripple mouldings

[Thijs Janssen] The conservation-restoration of ripple mouldings is often problematical. Traditional methods are either too expensive or too inaccurate. In order to find alternatives, the applicability of computer operated techniques for the reproduction of ripple mouldings has been investigated. This exploratory research concentrated on the accuracy of accessible techniques for milling and printing. A 17th century cabinet served as a case study. In order to make an accurate reproduction, the characteristics of one of its loose ripple mouldings was established. Accessible production techniques were selected with the help of Fablab, an organization that investigates and offers computer-operated techniques.

Two methods have been used for the reproduction of a ripple moulding. A routing technique with a three-axial milling machine and, secondly, a technique for 3D printing followed by Fused Deposition Modelling. In order to test these techniques, a contact 3D scanner was used to generate a 3D model of the ripple moulding. The milling machine has proven to be an accurate method, but to allow for actual production, some additional research has to be carried out. The method used for Fused Deposition Modelling did not deliver the required accuracy and it was also not possible to give the material a satisfying finish. Some alternatives are proposed that can be tested. The applicability of the computer operated production techniques is also limited by the scanning method. The contact scanner is not mobile so ripple mouldings that are fixed on a cabinet cannot be scanned but alternatives to this technique are proposed.

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Vergipsing: a specific damage on parchment bookbindings

[D Rachelle Keller] Deterioration and damage to parchment may have different causes. An exceptional appearance of damage is called ‘vergipsing’. The Dutch term – technically a misnomer meaning literally ‘to become plaster’ – was coined in an attempt to qualify the process of parchment becoming fragile and brittle at places displaying tension. The contaminated parts often appear to be grayish in color. This kind of damage is predominantly detected on the book’s spine, customary the section of the binding most frequently exposed to external influences of light, air pollution and dust.

It seems evident that the term ‘vergipsing’ has been used in different settings. On one hand the current state of research describes the occurrence of ‘vergipsing’ as a result of the absorption of sulphur dioxide from the air interacting with the calcium carbonate present in the skin thereby producing calcium sulfate, otherwise known as gypsum. However to no extent evidence actually demonstrated the presence of gypsum in the parchment. On the other hand conservator-restorers use the term ‘vergipsing’ when the parchment becomes brittle, resembling the physical properties of gypsum.

Outside The Netherlands no specific term for this phenomenon is known. Possibly ‘vergipsing’ in itself is not recognized as a particular type of damage. Preferably one should speak about the physical state of the parchment, rather than about ‘vergipsing’.

Today’s bookconservator-restorer is not inclined to handle ‘vergipsing’ on parchment bookbindings to prevent additional damage and the potential loss of material. To date no set procedure for the conservation of ‘vergipst’ parchment has been developed. The lack of guidelines may result in deleterious handling of the afflicted area and even the irrevocable detriment of precious antiquities.

Once the bookconservator-restorer has decided to attempt to conserve ‘vergipst’ parchment a number of problems may occur: the parchment can become gelatinous if the glue contains too much moisture, difficulties with the compatibility of the new backing with the old parchment may occur and, perhaps most obviously, the ‘vergipst’ parchment is terribly vulnerable to breakage due to its brittle nature.

In lieu of this hiatus in understanding the cause of ‘vergipsting’, this research hopes to provide a potential conservation methodology making use of the appropriate adhesive and backing. For glueing ‘vergipst’ parchment, Plexitol D360 appeared to yield the best results of all glues tested in this research. The flexible adhesive gives a solid suture and does not seem to deform the substrate. As a suitable backing both new vellum and Tyvek were tested. Both materials displayed advantages and disadvantages and can be utilized for different kinds of applications. The two materials are stable, but the degraded parchment seems to have a better adhesion with Tyvek. From an aesthetic point of view however, it is more obvious to use vellum, providing that the colour is similar to the old parchment. Consequently in regard to the use of an appropriate backing, this research does not provide a conclusive answer.

The filling-in of gaps in transparent finishes on wood using polymeric films

[Diederik Kits Nieuwenkamp] If a gap in an aged transparent coating on wood with surface texture (craquelure) is filled properly, the aesthetic value of the object will increase and the old finish with its historical value and patina can be preserved.

The aim of this study was to explore possibilities to fill up such gaps using exteriorly formed polymeric films. In the process of selecting appropriate substances for such a film, key selection criteria are safety for the object and the conservator-restorer, and features like texture, saturation of the surface, the gloss and the thickness of the film used and adhesion.

Film-forming qualities were tested for a set of commercially available synthetic resins. To obtain films with an aged-looking texture, a silicon mould was used. Additionally, several ways to manipulate the optical properties were tested.

The conducted experiments showed that the physical and optical properties of the film are mainly determined by the choice of resin. The films of resins with a low molecular weight turned out to be too brittle to handle. However, two other resins led to manageable and transparent films and, advantageously, both can be dissolved in ethanol, a solvent with minor health risks. The experiments also revealed that gloss is determined by the texture of the mould and can also be influenced by the solvent in which the resin is dissolved or by which the film is reactivated. Several techniques have been developed to temper the gloss. The thickness of the film can be influenced by its mode of application. Saturation
Study of agents that cause foxing on Japanese style paper

[Roosanne Kliphuis] Foxing, the occurrence of brownish spots on old paper, is well known for its disturbing appearance and in paper conservation—restoration from the 1930s on a lot of research has been carried out to sort out this problem. However, foxing on Japanese style paper, an important and widely used type of paper, has hardly been investigated. Since Japanese style and Western paper differ in composition and manufacturing process, the results of the foxing research of Western paper do not necessarily carry over to Japanese style paper.

The Dutch artist Carel Visser has made a set of woodblock prints on Japanese style paper that has various foxing problems. The foxing has been investigated by tracing back the context of the prints, examining them with analytical techniques, executing an experiment and reviewing relevant literature. The most important conclusion is that iron is likely to induce foxing in Japanese paper by oxidation and migration processes while the role of environmental conditions is probably much smaller.

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Understanding historical recipes for the modification of linseed oil

An experimental study into the properties of modified linseed oils for use as binding media in early northern European panel painting

Invited contribution (Dept. of Art History, UvA)

[Indra Kneepkens] Late medieval technical sources contain an array of procedures aiming at the modification of linseed oil for use as binding media in late medieval panel painting. Although the benefits of such modified oils are sometimes briefly described in the recipes, it is not always easy for the modern day reader to understand their exact meaning and application.

To gain a more profound understanding of late medieval recipes for the modification of linseed oils, a selection of recipes, each representing a particular category of binding media, was tested. A raw linseed oil that formed the basis of all other oils was compared with a washed, a sun-thickened and a boiled variety. Furthermore two oils were prepared in which a combination of amber and colophony had been dissolved and another one that had been boiled with pumice powder and bone white and to which zinc sulfate was added as a dryer. The resulting binding media were tested with different pigments and different application techniques. During and after application, the handling properties, drying time and appearance of the paints (before and after a period of artificial ageing) were analyzed and compared. Interestingly each of the different binding media turned out to have its specific affordances and weaknesses, depending largely on the choice of pigment and application technique.

A sample of each binding medium was also studied with Thermally assisted Hydrolysis and Methylation gc-ms in combination with Curie Point pyrolysis, to get an idea of differences in oxidation and polymerization as a result of the applied modification methods. This information was used in a preliminary attempt to understand the differences between the properties of the oils. Considering the extra expenses and trouble of preparing modified linseed oils, including terrible stench


² Kneepkens, I., J. Dijk, K. Keune, G.V. van der Snickt, A. van Loon. 2013. To be submitted.
The conservation and restoration of ostrich feathers usually focuses on the removal of dust and/or dirt particles on the feather and the consolidation of fractures in the feather shaft. Until now, the problem of discoloration in the form of yellowing on white (ostrich) feathers has not been described as such. This research focuses on what causes this discoloration on white ostrich feathers and how the yellowing may be reduced or even removed. The study is relevant for conservator-restorers of (ostrich) feathers, possibly in combination with textiles or other materials, in which the damage to feathers in the form of yellowing is visible.

A ball gown with a collar of ostrich feathers acted as a case study and determined the framework within which the research took place. Some yellowed feather material that already had come loose was used as reference in the analyses. White ostrich feather sample material was artificially aged under various conditions (light, temperature, and relative humidity). All samples were analyzed with microscopy and FTIR. Various solvents were tested for their effectiveness at reducing or removing the yellowing. The accelerated aging results show that yellowing can be induced by both light and temperature/humidity. Furthermore, the physical structure of the white ostrich feathers and the optical reflection of light by the white ‘color’ influence the perception of discoloration. The ideal treatment has a low ‘intensity’ (i.e., the treatment is reticent), stabilizes the conditional state of the object, and the treatment provides visual improvement to the object. Considering these aspects, treatment with a deionized water rinse is the most suitable choice found so far.

Acknowledgements

A.A. de Tagle (RCE), R. de Jongh, S. Neven, H. van Keulen (RCE), K. Keune (RCE), K.J. van den Berg (RCE), J. Pedrouso (RMA), S. de Groot (RCE), M. van Bonnel (RCE), F. Ligterink (RCE), M. de Krijzer (RCE), P. K. Padding (RMA), H. Bajia (RMA), I. Pappot (RMA), J. van Iperen (RMA), M. van der Laar (IC), L. Rijkers, H. Nevel (RCE)

and the risk of explosion, an estimation was made of the likelihood that some of these binding media would indeed have been used for late medieval panel painting.

Because of the extreme variety in properties that was found, this research supports the idea that perhaps a much wider variety of modified oils was used in late medieval painting in general, and even in single paintings, than we have so far been able to identify. Therefore, a more structural binding medium analysis is recommended in which the application technique and choice of pigments are considered key elements.

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Flaunting ostrich feathers

Research on the yellowing of white ostrich feathers

[Marjolein Koek] The conservation and restoration of ostrich feathers usually focuses on the removal of dust and/or dirt particles on the feather and the consolidation of fractures in the feather shaft. Until now the problem of discoloration in the form of yellowing on white (ostrich) feathers has not been described as such. This research focuses on what causes this discoloration on white ostrich feathers and how the yellowing may be reduced or even removed. The study is relevant for conservator-restorers of (ostrich) feathers, possibly in combination with textiles or other materials, in which the damage to feathers in the form of yellowing is visible.

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In the clouds with Willem Beurs?
A study into the value of De Groote Waereld in ‘t Kleen Geschildert […] (1692) by Willem Beurs as technical art history source

This thesis concerns research on the value of De Groote Waereld in ‘t Kleen Geschildert […] (1692), a treatise on the practise of oil painting written by Willem Beurs, as an art technological source. The relatively unknown Dutch painter Willem Beurs described in his treatise ‘general’ practical information including the preparation and use of various pigments and colorants, the preparation of canvasses and panels and the various brushes a painter could use. The largest part of the treatise consists of specific instructions for depicting all kinds of subjects, in which Willem Beurs mainly indicates which pigments and colorants the painter should use and how every subject should be build up. Even though several links between the contents of De Groote Waereld in ‘t Kleen Geschildert […] and actual professional painting practise in The Netherlands have been proven to exist in the past, there still is a lot of uncertainty concerning the value of the treatise and the work is not yet generally acknowledged as an important contemporary source on the art of oil painting in the Northern Netherlands in the 17th century. This uncertainty has been the main reason for setting up a research project.

This thesis can be divided into two sections. Within the theoretical part of the research Willem Beurs’ ‘general’ practical information has been thoroughly analysed and the treatise was placed within the 17th century tradition of writing on the Dutch art of oil painting. This has shown that De Groote Waereld in ‘t Kleen Geschildert […] can be considered rather unique in terms of structure and furthermore that the treatise contains interesting and exclusive information regarding the pigments and colorants that were in use in The Netherlands during the 17th century.

Within the technical part of the research paintings were analysed to determine to what extent Willem Beurs’ specific instructions for painting skies in land- and seascapes can be considered a reliable reflection of the actual 17th century painting practise in the Northern Netherlands. Nine land- and seascapes by the painters Ludolf Bakhuysen (1632-1708), Jacob Isaacksz. van Ruisdael (1628-1682) and Willem II van de Velde (1633-1707) from the collection of the RMA were examined. A total of 27 paint cross-sections was analysed using optical light microscopy, SEM-EDX and XRF analyses. The resulting information about the used materials and techniques was compared with the instructions given by Willem Beurs and this comparison has shown many similarities. With this result, the current research joins the previously demonstrated links between the instructions from De Groote Waereld in ‘t Kleen Geschildert […] and the actual professional painting practise in The Netherlands in the 17th century.

By means of this research, more insight has been gained on the value of De Groote Waereld in ‘t Kleen Geschildert […] and the resulting thesis can contribute to the annotated English version of the treatise, which is currently being undertaken by dr. A. Wallert (RMA). Although further research is recommended, it may be concluded that the treatise of Willem Beurs can be considered an uttermost interesting and possibly important contemporary source on the art of oil painting in the Northern Netherlands in the 17th century.

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K. Keune (RCE), I. Verslype (RMA)

Restoration history of seventeenth century cupboards from the Dutch province Zeeland

A study of the restoration history of five 17th century cupboards from the Dutch province Zeeland has been carried out in order to contribute to the history of furniture restoration, a field that has not been studied extensively yet.

The Zeeland cupboard can be defined as a type of cupboard that probably originates from the Dutch province of Zeeland, and is dated between 1620 and 1670. The oak cupboard has a separate under and upper section, and a total height of about 160 cm. Typically, the cupboard is heavily decorated with ebony and rosewood veneer, and carvings, e.g. lion heads, half-figures and cherub heads. The doors are embellished with geometrical patterns of cornice mouldings.

The many different structural elements, materials and decorations was one reason to take this type of cupboard as a case study. A second reason was that the cupboards are almost four centuries old, so likely to have undergone restorations.

Relying on a research project to contribute to the history of furniture restoration, a field that has not been studied extensively yet.

The five Zeeland cupboards, all with an unknown conservation-restoration history, have been visually analyzed and photographed in detail in order to discover possible restorations. A systematic procedure has been set up to document possible restorations, and instructions have been formulated how to recognize them.

[Laura Koster] A study of the restoration history of five 17th century cupboards from the Dutch province Zeeland has been carried out in order to contribute to the history of furniture restoration, a field that has not been studied extensively yet.

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The five Zeeland cupboards, all with an unknown conservation-restoration history, have been visually analyzed and photographed in detail in order to discover possible restorations. A systematic procedure has been set up to document possible restorations, and instructions have been formulated how to recognize them.
The characteristics of the cupboards, e.g. composition, the use of material and decoration, as found in literature have been updated and expanded with the results of this study.

At each cupboard various restorations were recognizable. For example, parts such as the legs and the rear side of the cupboards have often been replaced. Also, many small additions to the veneer, carvings and mouldings have been discovered. Locks and pivot hinges have often been refastened with screws, or have even been replaced completely. The study reveals that at least one of the cupboards consists of old and new parts, and there is clear evidence that the appearance of at least two of the other cupboards has been modified in the course of time.

In addition to clearly recognizable alterations and restorations, also potential alterations have been documented. This may be helpful in the decision-making process of future restorations.

The results of this study not only provides us with insight into the history of restoration of these 17th century Zeeland cupboards but we also have now a more substantial idea about how these cupboards originally looked like, which should make it easier to recognize any restorations at other Zeeland cupboards.

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Authentic, fake, restored or pastiche?
Two Renaissance jewels from the Mannheimer collection at the Rijksmuseum Amsterdam

[Suzanne van Leeuwen] In 1952 part of the art collection of the German banker Dr. Fritz Mannheimer (1890-1939) was added to the collection of the RMA. This collection includes many 16th and 17th century Renaissance jewels composed of gold, gemstones, pearls and enamel. Recently, the period in which two of the RMA jewels were made has been questioned.

In recent publications on Renaissance jewellery in other collections, archival, literature and technical material research have been used to make a statement on the authenticity of such jewellery. Since most of the Mannheimer collection has never been subjected to this type of research, the aim of this thesis research was to answer the question whether a provenance study, in combination with a non-destructive technical evaluation, can provide data about the attribution of the two RMA jewels. The technical research focused on the condition and the manufacturing of the jewels, the determination of the gemstones and the composition of the enamel. Data were acquired by means of visual examination, using a dichroscope, a spectroscope and XRF.

The results suggest that provenance research can be very helpful in determining the history of the jewellery and their current condition. This information is valuable for the conservator-restorer when a treatment plan has to be formulated.

Acknowledgements
Acetylace tone – research on cleaning brass elements on furniture

[Julia Leun ge] Conserv ing non-remov able cast and sheet-metal brass elements on furnitur e can reveal difficul ties concerning the desired appearance of the metal and the way to achieve this appearance. Common products for cleaning brass generally require rinsing after treatment, which is usually problematic in furniture conservation–restoration. Therefore a cleaning product was sought that does not require rinsing. It was expected that the chelating agent 2,4 pentanedione, also known as acetylace tone, would be a suitable candidate because of its fast evaporation rate.

By reviewing the literature, a better knowledge of current conservation practice regarding furniture with brass elements was obtained; it became clear that in choosing brass as a decorative element on furniture, colour has always played a large role. The similarity to gold of certain alloy compositions, of around 30 wt%, zinc, is and has always been much appreciated. In restoring brass on furniture conservator–restorers tend to be reticent, which is not always because of the desire for reversibility but also for mere esthetic reasons.

Three experiments were executed to obtain insight into the potential role of acetylace tone in the conservation of brass. The first experiment consisted of creating a chemical reaction by adding acetylace tone to five different copper salts which are also present in corrosion products of brass. FTIR analysis of the reaction products revealed that in all cases the formation of a copper-acetylace tone chelate was highly probable. The objective of the second experiment was to attain understanding of the long term consequences of treatment with acetylace tone. Brass test strips underwent treatment of different durations, followed by different after-treatments. Subsequently, the test strips were placed in an accelerated–aging machine under high relative humidity conditions (70%) and with temperatures varying between 50 and 90 °C. The outcome of this experiment was inconclusive, as treatment with acetylace tone left a layer of some kind on all surfaces, regardless of the after-treatment. The precise nature of these layers has not yet been established. A third experiment was conducted in order to monitor the behavior of brass undergoing extremely long exposure to acetylace tone. A test strip was therefore submerged in the chelating agent for 30 days, after which the surface of the brass strip appeared to have been etched by the chelation process.

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Etching of silver; technology, reconstruction and identification

[Marije Medde ler] For optimal treatment of historical objects it is essential to be able to identify manufacturing techniques. The aim of this thesis was to develop a systematic approach to distinguish etching from other decoration techniques on silver, based on visual characteristics and the chemical composition of etched silver objects.

Etching experiments were conducted based on three historical written sources (11th, 16th and 18th century) with silver etching recipes. Sterling silver coupons were used to reconstruct these historic recipes. The coupons were analyzed using stereomicroscopy, confocal microscopy, SEM and SEM–EDS to identify the characteristics of the etching technique and to enable differentiation between etching and other silver decoration techniques.

Eight differentiation features were identified and used as a guide to identify the decoration technique on works of art. Some objects in the collection of the RMA were examined in order to test the systematic approach and its suitability in future research.

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Vincent van Gogh drew during his stay in Antwerp and Paris a number of drawings with colored crayons that probably contained an oil, wax or grease as binding medium. To gain new insight into Van Gogh’s working method and to better understand the nature of his drawing technique, this group of drawings has been closely examined. Focus of this thesis were the questions: Which crayons were on the market in late 19th century? What is the composition of the coloured crayons used by van Gogh and can we trace back where he purchased them? Can morphological characteristics reveal more about the nature of the binding medium of a crayon?

In historical sources from the 19th and early 20th century fourteen recipes were found for crayons containing diverse wax- or grease materials as binding medium, always in combination. Most crayons were used for writing on glass or metal, only a few were specifically meant for artists. Also, no information was found on European manufacturers and suppliers of such crayons, while more data were available on wax crayons on the American market.

Four of the fourteen historic recipes found were reconstructed. The influence of different ingredients on the quality of the crayon was studied, as were their morphological characteristics. Eight drawings by Van Gogh, and five by contemporary artists like Schuffenecker, Bernard and Gauguin were examined visually in reflected, raking and transmitted light and under magnification. XRF analysis was conducted at seven drawings. Fifteen micro-samples were taken from selected drawings. These were analyzed with FTIR and GC-MS.

XRF analysis confirmed the presence of pigments typically for the 19th century. FTIR analysis revealed the presence of fillers (clay, chalk) in the crayons but was less useful in determination of binding media. Better results were obtained with GC-MS analysis, determining a combination of beeswax and grease (tallow) in the three samples analyzed. This was in agreement with the historic recipes. Based on examination of lines drawn with reconstructed crayons and the original drawings, a nomenclature for morphological features specific for crayons with wax-, grease- or oil containing binding media was developed.

Crayons with beeswax and grease as binding medium were on the market in the late 19th century and were indeed used by van Gogh as drawing material. Visual examination proves to be an important pre-determination step, but a final conclusion on which binding media are present in a coloured crayon needs to be verified with GC-MS analysis. The nomenclature for morphological features is usable to identify aged and new crayon lines as crayon with a binding medium of wax and grease.

This thesis was part of the research project ‘Van Gogh’s studio practice in context’ which is a joint project of the vGMA, the RCE and Shell Research Laboratories.

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Van Gogh Museum Amsterdam, Shell Research Laboratories Amsterdam, L. Megens (RCE), H. van Keulen (RCE), S. de Groot (RCE), N. Lingbeek (IC)

[Alexandra Nederlof] Vincent van Gogh drew during his stay in Antwerp and Paris a number of drawings with colored crayons that probably contained an oil, wax or grease as binding medium. To gain new insight into Van Gogh’s working method and to better understand the nature of his drawing technique, this group of drawings has been closely examined. Focus of this thesis were the questions: Which crayons were on the market in late 19th century? What is the composition of the coloured crayons used by van Gogh and can we trace back where he purchased them? Can morphological characteristics reveal more about the nature of the binding medium of a crayon?

Dry Cleaning: the effect of six chemical residues on unvarnished oil paintings

Zuhura Oruç-Iddi

In the process of surface dirt removal from unvarnished paintings with dry-cleaning materials, some chemical residues can be left on the surface. These chemicals pose a potential risk to the oil paint and therefore a study has been carried out, focusing on the optical and mechanical effects that six extractable chemicals may have on unvarnished oil paint layers. Six chemicals were selected (a surfactant, an UV-light stabilizer, two plasticizers, a vulcanizer and an antioxidant) that have been detected recently on unvarnished paint surfaces (RCE, unpublished results).

In the experiments the pure chemicals were applied at various concentrations on oil paint samples and microscope glasses. After light-aging, both accelerated-light and natural-light aging, the latter in line with dark aging, color changes were evaluated visually, the naked eye in daylight and UV light, and combined with colorimetric data. Cleaning tests were carried out to establish whether the observed optical changes could be remedied.

Discoloration connected to any of the six chemicals has not been observed, the main optical effect being an increase of the gloss after application of the substances to the oil paint samples. The Hirox 3D microscope of the RMA allowed a detailed examination under 140× magnification of pressure tests on the oil paint samples. Oil paint samples treated with the vulcanizer showed embrittlement. Vulcanizers are present in rubber and rubber erasers and make-up sponges. The six types of chemicals are all easily removable with aromatic solvents.

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The execution of wax-resin linings by Johannes Albertus Hesterman (1848-1916) and sons
A research into their working method and materials

Saskia van Oudheusden

This Master thesis concentrates on the wax-resin lining method of the Dutch artist and conservator Johannes Albertus Hesterman (1848-1916) and his sons Frederik Coenraad (1873-1932) and Johannes Albertus Jr (1877-1955). Five 17th century portraits of various doctors from the collection in the AM, which were lined by the Hestermans in the years 1907-8 are investigated. In addition, reconstructions of wax-resin linings and research into literature and archival sources have been carried out.

The similarities between the linings that have been studied suggest a standardised lining method. The linings are carefully executed by the Hestermans with attention to and respecting the original material. The study of a logbook of the Hestermans has made clear that they lined paintings as a preventative measure, with the exception of relatively new paintings. This research shows that in their careful, and for that time, ethical approach with regard to the lining of paintings, the lining method of the Hestermans closely resembles that of Willem Antonij Hopman (1828-1910) and his father Nicolaas Hopman (1794-1870), the founders of the wax-resin lining method.

This research has been presented as a poster at the CiNC conference-Conservation in the Nineteenth Century, Copenhagen 13-05-2013/14-05-2013 as well as at the Interim Meeting of iicom-cc Theory & History, Copenhagen 16-05-2013/17-05-2013.

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Darkening of gilt leather hangings in The Netherlands

Characterizing degradation in the decorative finish of two case-studies: Sint Pietershof Hoorn and Weeshuis der Hervormden Schiedam

[Martine Posthuma de Boer] In The Netherlands a considerable amount of 18th century gilt leather hangings has been preserved 'in situ'. For the past decade heritage professionals have raised great concern about their material condition, as several hangings locally show severe darkenings. These degradations have been registered in at least eight locations in The Netherlands, but are expected to be more widespread. Conservator-restorers and interior specialists suggest that the dark stains may be the result of past conservation treatments with oil dressings and emulsions, during the second half of the 20th century.

A systematic description and characterization of this darkening has been started by examining two examples of Dutch 18th century gilt leather hangings: Sint Pietershof, Hoorn and Weeshuis der Hervormden, Schiedam. A literature and archive review of the products used in gilt leather conservation during the past decades has been undertaken, allowing a better understanding of the relationship between past conservation treatments and the observed degradations.

Analyses of the different layers of the decorative ‘golden’ finish have been carried out – consisting of a silver leaf applied with a parchment glue and coated with an oil-resin varnish (‘golden varnish’). Visual observations of the degradation phenomena have been complemented by comparing cross-sections of un-darkened and darkened gilt leather samples, using light microscopy, SEM-EDX and GC-MS. The results indicate that degradation processes related to the darkening are taking place in both the silver and varnish layers.

This study is a first step in identifying the degradation phenomena that occur in the decorative finishes of gilt leather hangings, which can be related to past conservation treatments. The irreversible character of the degradations in both silver and varnish layers, underlines the importance of further identification of the degradation mechanisms and the role of climatic conditions, such as relative humidity, moisture and gaseous pollutants. Eventually, this will contribute to the development of preventive conservation measures for gilt leather hangings ‘in situ’ that are known to have undergone oil treatments in the past.

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The application of solvent gels in the conservation of historic interiors
Two case studies

[William van der Sar] In the 1980s, professor Richard Wolbers developed alternative methods for the cleaning of painted surfaces. His innovative approaches consist of utilizing specific aqueous methods (enzymatic digestions, chelation, acid-base chemistry and tailored solvent-surfactant systems) to aid in the removal of non-original coatings or retouches. When thickened, these water-based or solvent-based systems provide more control during cleaning, in contrast to the application of free solvents. Also, they are favorable for the removal of complex layers and can solubilize a wide range of materials. Furthermore, these systems can be formulated to unpack specific layers while leaving others layers intact. Removing a specific layer requires some knowledge about the paint composition of the object and the layer(s) to be removed. Although Wolbers’ cleaning systems could resolve problematic cases, they are not yet entirely integrated into everyday practice in private and public conservation studios. His philosophy that “a conservator should be able to make his own cleaning agents and thus know what materials are being used,” is an ambitious philosophy which requires chemical understanding and insight.

Also, he does not want to provide ‘cure-all’ recipes, but rather to offer a new methodology with which to manipulate and apply various cleaning components. Two case studies have been carried out involving the conservation treatment of a canvas mural (ca. 3.3 m × 3.0 m) in the Holy Innocent Roman Catholic Church in Brooklyn NY. This mural was damaged by water from a roof leakage and darkened due to accumulated layers of dirt and soot resulting from a fire in the past. A solvent based Carbopol-solvent-surfactant system was tailored to remove the non-original alkyd coating and the layers of dirt and soot from the water sensitive emulsion paint. The second case study focused on the preliminary investigation and proposal for treatment of a brick wall sculpture (ca. 3.0 m × 7.8 m) in Spencer Lab, Mechanical Engineering department of the University of Delaware in Newark. Due to leaks in the roof and skylight areas over the years, efflorescence and tide lines became visible at the surface of the mural. The efflorescence and coating were sampled and tested and subsequently a Pemulen emulsion gel was tailored to remove the coating simultaneously with the efflorescence.

These case studies examine the considerations necessary before selecting a cleaning gel and describe the customized solvent gel specific to each artwork. The chemistry and function of the ingredients used to make these gels are explained. In this way, when a conservator-restorer knows what is available, how to customize it, and how the ingredients work in specific cases, a deliberate cleaning system can be selected or devised.

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The ideal state of the object:
four 17th century doors from the Hof van Moerkerken in Mijnsheerenland
Application of a methodology

[Merel van Schrojenstein Lantman] This thesis concerns the conservation and restoration of a painted door from the 17th century. This door is part of a group of four doors, painted at the same time for a country house in the southwest of The Netherlands. These four doors are very special, because doors from the 17th century, decorated with colorful and beautifully painted life size figures, have very rarely survived in The Netherlands.

Today, the doors are still in the same house as they were made for, but the interior of the house has undergone a lot of changes and the doors too. This research started with a quest to find the original location of the doors in the house. This was hoped to be achieved using architectural paint research, archival research and research into the building history. Traces of paint on the surface of the door that could be matched to traces of paint on the doorposts or walls would prove their origin. These traces were not found however. Research in archives and building history did add a lot of information about the history of the house but not specifically about the doors.

The results of this research were applied in a pilot treatment of one of the doors. What made this a challenge, was that the four doors have to be treated as a group, and not as singular objects. Furthermore, a connection with the interior which they came from and will go back to must be kept. Therefore, the method of stabilizing the object first and then look at
the aesthetics and determine where action is needed, will not do in this case. An integral approach was needed to ensure a unified result. To achieve this, a methodology was used to assess the different values of the doors in order to make treatment decisions. This methodology was adapted from Barbara Applebaum as described in her book “Conservation Treatment Methodology”. To determine the ideal state of the object, also the value model of Alois Riegl as described in “The modern cult of Monuments” was used.

The determination of the ideal state has been tested in practice, by execution of a treatment of one of the doors with the goal of reaching the ideal state as previously determined. During treatment, some problems were encountered and these made it clear that not all treatment decisions can be made before starting a treatment. Sometimes it is also necessary to deviate from the predetermined goals.

Although the treatment was not yet finished by time of publishing this thesis, the treatment has successfully met the predetermined goals as a whole with a minimum of compromise. Application of the method helped to make informed treatment decisions and to achieve a unified result. It is strongly recommended that the three other doors will also be treated using the same methodology. A paper about this work is in preparation.

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Oral history, a source for the future
The application of oral history to historic interiors and the history of restoration in The Netherlands during the 1970s

[Hinke M. Sigmond] Research has been carried out regarding the working method of conservator-restorers of historic interiors in The Netherlands during the 1970s. As research strategy a qualitative research method, oral history, has been used in the form of individual in-depth interviews.

The objective of the research was twofold. On one hand it aimed at composing and adjusting a research method specifically for this field, but which could be useful for other conservation-restoration professionals as well. On the other hand, with the use of oral history, it was intended to gain more insight in the history of conservation-restoration as a profession and, on a more specific scale, information about working methods, the working environment, and past restoration materials and techniques. More knowledge about these subjects is valuable for future development of the profession, and can be useful in daily practise, e.g. how to deal with old restorations. Because of this broad approach, the research had a strong inventory character.

A target group of thirteen conservator-restorers, active during the 1970s in conservation-restoration of historic interiors, has been approached, of which eight agreed to participate in the research. The interviews have been recorded digitally and transcribed. An interview guide has been set up and used during the interviews. Three themes played a prominent role in the guide: background and education, working environment, and materials and techniques. The interviews yielded a great deal of information, not only in relation to the three subjects, but it has also revealed new, interesting issues which were not foreseen. Insight has been gained on conservation-restoration as a profession in the 1970s and the mutual working relationship of conservator-restorers with other colleagues in the field. Apart from the three foreseen categories, new factors that played a role in gaining knowledge in the working field have been established, namely the ‘Central Laboratory’ and the ‘Rijksdienst voor de Monumentenzorg’
(Dutch Agency for Cultural Heritage). From the information gained from the interviews, it can be concluded that the work and learning experiences during practical work have played a prominent role in the build-up of professional knowledge. The career paths of those interviewed are diverse and are characterized by a great deal of self-sufficiency. The interviews have also given a more profound insight into developments in the field of conservation-restoration and shifting values and interpretations over time. In a broader sense the research has helped to position the profession in its historic context. The research methodology itself has proven to be successful and is, with some adjustments, possibly useful for future research in this field.

Acknowledgements

Research and restoration of Family Portrait by Gillis van Tilborch (appr. 1665)

As part of the two-year post-master training course of the Conservation and Restoration of Cultural Heritage at the UvA, an investigation and restoration of the painting Family Portrait by the Flemish artist Gillis van Tilborch has been carried out. This painting, owned by the Royal Picture Gallery MDH, was purchased in 1827 by King Willem I for the Mauritshuis. Family Portrait is an oil painting on canvas dating to the second half of the 17th century, it measures approximately 80×104 cm and is signed in the lower right corner “Tilborch”. The restoration of Family Portrait was necessary to improve both the legibility and aesthetic quality of the painting. Before the treatment, the painting was covered with a thick layer of yellowed varnish with a marked degree of cracking, as well as overpaint, both of which were visually disturbing.

To support the decision-making process during the restoration, an extensive literature and archival research was carried out, focusing on the life and oeuvre of the painter Gillis van Tilborch, his materials and techniques, the provenance of the painting and the paintings restoration history.

Initially it was believed that the architect, Peter Balkenende, his family, including his son-in-law the painter Paul Potter and Balkenende’s friends, the painters Adriaan van Ostade, Carel de Moor as well as Gillis van Tilborch himself were depicted in the painting. However, in a 1874 catalogue the MDH revealed that this assumption is incorrect. As a result, the identity of portrayed family is currently unknown.

The painting is no longer on its original stretcher, which was most likely replaced by W.A. Hopman during a treatment in 1891. The original canvas is of plain weave and made of linen; flax fibers that were spun into a thread. Only along the top left cusping can still be seen. Tilborch painted two priming layers on the painting, which were

In 1974 conservator-restorers remove a later overpainting in St. Geertruidskerk Houthem to Limburg, so the baroque frescoes are visible again. Source: Cultural Heritage Agency of The Netherlands
applied immediately and quickly in one or two coats of paint. The floor of *Family Portrait* is remarkable; research revealed the artist painted first a floor with tiles in checkerboard pattern in black and white and later covered it with a brown paint to imitate a wooden floor. It is believed that the artist intentionally let the tile pattern show through the brown paint. In 17th century houses in Brussels it was common to paint a checkerboard pattern on a wooden floor. Tiles were not affordable for everybody.

The documented restoration history of the painting starts in 1841. In this year, and again in 1845, the painting was washed and varnished by the Amsterdam restorer Nicholas Hopman. In 1888, William Antonij Hopman, the son of Nicholas Hopman, varnished the painting. In 1891 the painting underwent two treatments: the first by Alois Hauser, Berlin’s famous painting conservator-restorer, who performed a small treatment and the second in that same year by W.A. Hopman who gave the painting a wax resin lining. Finally, in 1993 another small conservation treatment was performed. Obviously, the varnish on the painting is most likely not original and consists of several layers.

Prior to the restoration, the painting was extensively documented in the forms of images and reports. Images of the painting include both front and back, in normal light, raking light and uv. Furthermore, the painting was examined with the naked eye and under the stereomicroscope. In addition, a checklist was used to document the condition of the painting for restoration. Structurally, the wax resin lining had kept the painting in good condition, although there were many aesthetic issues with the painting. After examining and documenting the condition of the painting, a treatment proposal was written and accepted.

During the actual restoration, various types of retouchings from previous restorations were found. It became difficult to distinguish original paint from overpainted areas and therefore it was necessary to carry out technical research.

Multiple imaging and analytical techniques were used, including radiography of the painting overall, xrr imaging of the painting overall and xrf to analyze the pigments used by the artist. A number of cross-sections were taken, embedded in resin, and examined under magnification, and one was also analyzed using SEM-EDX. Lastly, a fiber sample from the original canvas was analyzed using PFM.

Also, during the restoration cleaning tests were carried out to determine the solubility of the varnish and eventually it was decided to use ethanol dispersed in Klucel G. The characteristics of the various types of overpaint were determined and they made a distinction from the original paint possible.

At this moment the restoration of the painting is finished and the painting is on show at the Prince Willem V Gallery of the MDH.
Decision making
on a Royal dressing table

A major restoration of an Italian 19th century dressing table of ebonised wood with marble inlay

[Saskia Smulders-de Jong] The restoration of an Italian 19th century dressing table was carried out in the context of the completion of the post initial phase of the UvA programme Conservation and Restoration of Cultural Heritage – Wood & Furniture. This thesis forms the final conservation report of this process.

An ebonised and marble inlaid suite of furniture in neo-Florentine renaissance style was purchased in 1874 by king Willem III (1817-1890). This set of furniture became part of the collection of Paleis Het Loo (Apeldoorn, The Netherlands) in 2004. One of the pieces is a dressing table. The construction, veneer, mouldings, marble, mirror and finish of this dressing table were severely damaged. Many damaged and loose parts had to be conserved or restored and missing parts had to be complemented. Restoring the palatial character of the object was the intention of this project so it can be displayed in the permanent exhibition in the king’s bedroom.

Decision making is inseparable from the profession of conservation therefore the decisions about the treatment of the dressing table ran as a leading thread through this thesis. According to the results of various studies the best possible restoration and reconstruction methods were selected. There was an interdisciplinary collaboration with art historians, scientists, marble specialists and fellow conservator-restorers because of the diversity of existing materials in the object and the nature of the studies.

The restoration, in cooperation with the furniture conservator-restorer of Paleis Het Loo, was carried out in four months’ time. In addition to securing all the loose parts, more than hundred missing parts were added, including 24 veneer fragments, 22 pieces of stone and 61 parts of moulding in seventeen different profiles with a total length of twelve meters. Research was performed during this restoration work. The applied marble was identified and historically accurate reconstructions of the missing veneer, mouldings, stone and mirror were made. The manufacture of the dressing table was almost completely revealed and the conjecture about the authenticity of the black finish was strengthened on basis of scientific research.

The mutual influence of the choices related to the research and practical work was great. The diversity of components and materials present in the dressing table made a major contribution to this influence. Therefore, the decision making concerning this restoration project proved not to be ambiguous.

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Royal & heavenly

Nineteenth century blue dyes in the Rijksmuseum costume collection

[Joni Steinmann] Six 19th century costumes of the RMA collection were analysed to establish if a correlation exists between the early synthetic blue dyes used and the condition of the objects. This project was limited in scope to objects created between 1857-1876, the period in which most early synthetic acid and basic dyes were discovered.

Samples were taken from six objects: three silken gowns, one woollen gown, one doll with a silk dress and a batiste blouse with light blue ribbon. In addition, samples were taken from three other objects for use as comparative material.

In this study, several analytical methods were employed. hPLC revealed that several early synthetic dyes had been used, including Water Blue IN, Fuchsine, Mauve, Indigo Carmine and Picric acid. However, six of the in total eighteen samples contained a colorant undetectable by the hPLC. Inorganic pigments like Prussian blue give no response when tested with hPLC, so this was assumed to be a possible explanation. In order to conclusively prove the presence of Prussian blue, a Prussian blue Indication Test was performed, in addition to analysis with SEM-EDX and FTIR. All six samples did indeed contain Prussian blue.

The costumes were further investigated, making use of a condition assessment form which was developed for this purpose. With the form, it was possible to look systematically at and describe the damage of each of the costumes. If any damage had occurred as a result of synthetic dye use, fading, discoloration or bleeding of the dyes was expected to be found – but surprisingly, all costumes were found to be in remarkably good condition.

To determine if storage conditions had favourably affected their state of preservation, microfading was performed on two of the objects: one Prussian blue dress, and the woollen dress with synthetic dyes. The Prussian blue dress faded rapidly during light-fastness testing, and afterward the tested area of 0.5 mm diameter had faded visibly, whereas the woollen dress seemed imperceptibly affected by the fading test. However, a week later, the faded spots on the Prussian blue silk dress had disappeared. This regeneration behaviour of Prussian blue has previously been noted in paintings, and the textile results imply that this behaviour also occurs in textiles dyed with Prussian blue.

It seems remarkable and defying expectations that several of the samples, dating from 1857-1876, were found to contain Prussian blue. Also the observation that the costumes are in relatively good condition taking into account their over 150 years of age, may possibly be due to the use of Prussian blue. Prussian blue is an inorganic compound and it has been found to possess good wash-fastness properties. In several objects Water Blue IN was found, often in addition to other synthetic dyes. Five different dyes were found on the woollen dress, suggesting that the colour result is more economically obtained by mixing dyes rather than having a dye for every possible colour. Surprisingly, even dyes that normally require either an acidic or an alkaline bath were found mixed on one object. One may conclude from this that neutral baths were used to bind these dyes to the fibres. It would appear that synthetic dyes such as Picric acid and Indigo carmine, and even natural dyes such as Cochineal, were still being used in the late 19th century, even though alternative synthetic dyes with better colourfastness characteristics were already on the market.

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Van Gogh’s cobalt blue
Research into the possible causes for trace elements found by means of SEM-EDX in two distinct variants of cobalt aluminate used by Vincent Van Gogh 1886-1890

[Lise Steyn] SEM-EDX analyses of dozens of cross-sections of Van Gogh’s paintings revealed that he used two distinct variants of cobalt blue between 1886 and his death in 1890. Samples of his Parisian period (1886-1888) contained a comparatively high Ni/Co ratio, whereas this ratio is much lower in samples from his post-Parisian period (1888-1890). Also, Parisian and post-Parisian samples showed differences in other trace elements.

Investigation of Van Gogh’s letters showed steady orders from Parisian colour merchant Tasset et l’Hote (via his brother Theo in Paris) during his post-Parisian period. Van Gogh’s paint orders were chronologically tabulated and compared to SEM-EDX results for this research. It was possible to establish that the variant predominantly seen in the Parisian period could be attributed to one colour merchant, Julien Tanguy, and the variant in the post-Parisian period to Tasset et l’Hote. Further comparison of paint samples from other artists who had been known to use either of these colour merchants have supported these findings.

Because both cobalt blues show differences in traces of other elements, 19th century recipes and production processes of the pigment were investigated, as well as the metallurgical processes to extract cobalt and aluminium from ores. From the results it appeared that the nickel content of the samples can be related to the different origins of the ores that were used for the production of the pigments.

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Ceramics conservator-restorers sometimes experience that after bonding freshly broken porcelain a darkening of the bond occurs. Naturally one wishes that bonds are not too visible, or at least not disturbing. A cause for the darkening has not yet been determined. The goal of this thesis was to gain more clarity about the possible cause(s) of the darkening of bonded porcelain fractures, and to avoid it at future restorations. The initial hypothesis was that darkening is caused by a difference in refractive index of the adhesive (an epoxy resin) and the porcelain glaze. For glass restoration it has already been determined that a matching refractive index can lead to an (almost) invisible join.

To limit the amount of data, the research focused on Chinese porcelain. Also, because the darkening seems to happen relatively often with this type of porcelain. Tests have been performed to establish the composition of Chinese porcelain bodies and glazes, because these aspects determine the visual characteristics of the porcelain. Apart from that, several bonding tests have been performed on Chinese porcelain dating from the 17th to the 19th centuries. Objects on which a darkening appeared were studied with a stereomicroscope and a scanning electron microscope. Early on it could be determined that a mismatch in refractive index (between adhesive and glaze) was not the cause of the darkening. Also other hypotheses, like migration of the adhesive into the body or under the glaze, could be disproven, considering the very low porosity of the porcelain body and the fusion of the body and the glaze.

An alternative explanation was found as the darkening of bonds seems to be caused by a remaining amount of space between the two bonded fragments. Sherds that seem to fit correctly, as judged by the naked eye, can be slightly separated at the microscopic level. Research has shown that when the space is 20 μm (or less) the fracture is nearly invisible, while a space of 35 μm leads to a clearly visible darkening. The observation that at the micro level porcelain fragments do not fit perfectly is probably caused by a slight deformation of the porcelain on breaking. Adding a white pigment to the epoxy resin can lead to a reduction of the visibility of the fracture. Future research should reveal the optimal amount of pigment that is needed to make the bond less visible.

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During the two year postgraduate phase of the Conservation and Restoration of Cultural Heritage programme at the UvA, a project has been carried out concerning the conservation and restoration of a commode that is owned by the furniture conservation studio Hoving & Klusener. At the start of the project the commode was in a poor state. The substrate and veneer were severely distorted, especially on the left-hand side of the object. Also, poor fillings from previous restorations were visible and the finish of the commode was covered with dirt. Interestingly, this finish seemed to be an old and uniform layer. The aged finish and discolored wood were considered to be patina, and it was decided to preserve them. Obviously, this limited the options to treat the veneer and substrate.

As the left-hand side of the commode was the most damaged, it was decided to focus on the conservation of this side of the commode.

Before deciding about the treatment the finish was analyzed. Spot tests used to identify the composition of the finish were not successful and also optical techniques (uv light, microscopy) were inconclusive. The Hirox 3D microscope only showed the finish to be a compact film.

Subsequently, at the RCE several analytical techniques (e.g SEM-EDX) were attempted but all the resins used to embed the samples, Polypol (Polyservice PS 230) and Technovit (2000 LC), turned out to affect the finish on the sample. Also, a gold coating on the sample did not protect the sample from the effect of the resin.

Eventually, pyrolysis gc-ms revealed that the finish consists of beeswax and colophony (10:1) and a small amount of oil.

After the analysis of the finish, the animal glue, the veneer and substrate were examined and their properties determined the possible methods to treat the veneer on the left-hand side of the commode.

It was decided to lift the veneer, to remodel it partly and to adhere it on the substrate.

Various options to lift the veneer safely were tested. The method that was selected in the end was to lift the veneer with ethanol in blotting paper and a spatula. The substrate was treated to increase the strength of the construction. The veneer was flattened with moist and pressure. After this the veneer was adhered on the substrate with a mix of bone and hide glue (1:1).

At the end of the project, the conservation of the left-hand side of the commode was finished.

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The investigation of the use of ion chromatography for identification of early stages of glass sickness

Glaszickness is a form of glass degradation that is well known in the world of glass conservation. The symptoms of the process are sweating (or weeping) glass and crizzling. Much has been written on the advanced stages of glass sickness and its conservation, but very little is known about the early stages. In particular, signs of the early stages of glass sickness are difficult to pinpoint visually, as two recent cases point out.

During an intensive monitoring of the glass collection of the RM, it had been observed that glasses in different stages in the deterioration process and from different origins eventually showed similar degradation patterns. Also, for some objects it was not clear whether they actually suffered from glass sickness or if the surfaces were contaminated. At the same time, independently, conservator-restorers at the MBvBR encountered the same problems. Both museums developed a categorization of the observed surface appearance, but often struggled to categorize objects definitively, as degradation symptoms were not clear.

In order to get a better, clear-cut indication of the early stages of glass sickness, the use of ion chromatography (ion c.) has been investigated. The cations that leach out of a glass are mostly sodium, potassium and calcium ions and these ions fall precisely in the range of ions that can be analyzed using ion c. at a parts per million detection level. Therefore, ion c. is well suited to detect leached-out ions at glass surface deposits, the initial, almost invisible, stage of glass sickness.

After setting up the ion c. system at the RCE laboratories, sampling and extraction experiments were carried out that eventually led to an extraction protocol that yields reproducible results.

Furthermore, a few surface samples have been taken from museum objects and analyzed, demonstrating the potential of this technique. Complementary results from XRF and SEM-EDX analyses showed that degradation products can be linked to the composition of a glass.

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The Ince Blundell composite marble statue of a man with an ivy wreath ‘Marcus Aurelius’: revisited/restored

Nicolas Verhulst In the 18th century Henry Blundell bought an antique over-life-sized statue of ‘Marcus Aurelius’ to add to his collection at Ince Blundell Hall, north of Liverpool. His private collection of antique sculpture became the second largest in the United Kingdom, after the Townley collection (British Museum). As a ‘composite’ sculpture, ‘Marcus Aurelius’ exemplifies the tradition of 18th century restoration ethics. During the condition report the sculpture was divided into three different zones: the plinth with the feet were separated from the main body and a third zone existed of 58 pieces. The treatment proposal focused on a series of complex issues. A range of pins and clamps needed to be removed from lead and 18th century resin. After cleaning the surface (removal of dirt), the disturbing staining of the white Carrara marble by old resin needed to be tempered or removed. Considering different cleaning methods, a surface-acting impregnating gel worked by dissolving 4% agar in deionised water. Grey dirt layers and sulphation could be removed with a Nd:YAG laser. To reinstate the structural integrity of the statue a ‘piston fit pin sleeve’ armature was devised, besides the use of common pins. This enables an easier disassembly in the future, as the stainless steel pins slide into stainless steel sleeves that are fixed inside the holes with a bulked epoxy. For choosing the correct colour of the filler seven adhesives with seven fillers were tested. This ‘colourfill chart’ worked as a reference and each recipe could be adjusted by adding more or less fillers when searching for the desired colour.

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Furniture that are presented for conservation-restoration nowadays seldom have their original coating. As a result, a lot of furniture has lost its original appearance. Knowledge of original coatings helps to determine the original appearance of these objects and can also have an impact on future restorations.

Research of transparent coatings of Dutch furniture made between 1600-1940 is a tripartite project of the RMA, the RCE and the UvA. Within this project, a study has been carried out of transparent coatings on furniture in the Jachthuis Sint Hubertus, located in the ‘Nationale Park de Hoge Veluwe’ (The Netherlands). The Jachthuis, where the Kröller-Müller family lived, was built between 1916 and 1920. It was modeled after the work of the architect H.P. Berlage (1856-1934) and can be described as ‘Gesamtkunstwerk’. One of the pieces of furniture in the living-room, a cabinet of teak and coromandel that has been made by the prominent company H.P. Mutters & Zoon between 1920-1924, has been analyzed in detail.

Visual analyses (UV, day-light) revealed a smoothly applied coating, which advocates a possible original coating. GC-MS analysis revealed a surprising composition of the coating, consisting of linseed oil, shellac and colophony. This led to an analysis of sources from the beginning of the 20th century containing information on and recipes of varnishes. Finally, the coating of the cabinet has been put into a broader context by technical research done on the coating of two comparable pieces of furniture. Both were finished in the same way as the cabinet.

Based on the research that has been carried out, it was concluded that the coating of the cabinet in the living-room of the Jachthuis is original.
Transformator transforms
Guiding changes in an artwork by Thomas Hirschhorn

[Karolien Withofs] An internship in the conservation studio at the S.M.A.K., Ghent, Belgium, was part of the two year postgraduate phase of the education programme for conservation and restoration at the UvA. The internship consisted of the conservation-restoration of the artwork Transformator (1997), made by the Swiss artist Thomas Hirschhorn.

The artwork is made of used objects and industrially produced, non-durable materials. It consists of four piled tables covered with blue garbage bags, which are fixed with brown packaging tape. On each table lies a big rock made of aluminium foil and a drawing or a collage. On the upper table a video shows the written text Etre en haut c'est etre en haut with no sound. Next to the tables four big teardrops hang on the wall. They are made of aluminium foil, painted in red and blue. All components of the artwork are interconnected with strings of squeezed aluminium foil.

In the first years of its existence Transformator has been exhibited frequently until its condition deteriorated resulting in no further exhibitions. The artwork remained in the depot of S.M.A.K. for ten years. During this postgraduate project the material condition of Transformator and its components was mapped. The aluminium foil has suffered mechanical damage which translates in damages in the paint layer on top of it. The paint itself is brittle and could not follow the movements of the aluminium foil, resulting in loose paint and paint loss. The teardrops were so fragile, they could not be hung on the wall anymore. The garbage bags had tears and scratches and the degraded packaging tape could not fix the bags to the tables anymore. As a result, the bags hung loosely around the table tops.

The implications of this condition for the meaning of the artwork, as well as Hirschhorn’s views on the conservation and the lifetime of his works have been considered and a conservation strategy has been defined. Components that have been industrially produced and not modified by the artist, like the packaging tape, can be replaced by new material if they are degraded badly. Letting the degraded material be part of the artwork contradicts the meaning of the material in the work, as a universally known and ever available material.

Components that have been created by the artist are irreplaceable. For these components a conservation treatment has been defined. A supporting hanging system for the tears has been developed. The paint on aluminium foil has been consolidated and lacunae have been retouched. Consolidation and retouching of the paint on the PP packaging tape has been done as well. However, future adhesion problems are to be expected because the apolar PP surface is not appropriate for good adhesion. When that time comes, the added materials will be removable. The plasma pen, still in development at the University of Bern, will hopefully be available as a tool for conservators to give this adhesion problem an appropriate and durable solution.

Transformator will benefit greatly from a good storage system. The components should be protected from damaging mechanical forces and from light which is the main cause of chemical degradation of these materials. The long-term preservation of the video-component poses some questions still, mainly because CRT monitors will become obsolete. The exhibition of the artwork, programmed in the near future, is a good cause for contacting the artist and establishing a long-term preservation plan for the video-component.

Acknowledgements
Stedelijk Museum voor Actuele Kunst (S.M.A.K., Ghent, Belgium), S. Saverwyns (KIK-IRPA), W. Fremout (KIK-IRPA)
In this thesis the treatment and research of *The Lamentation of Christ* are reported. The painting is attributed to Colijn de Coter and dated between 1510 and 1515. It belongs to the collection of the RMA since 1875. The painting will be exhibited in the newly renovated RMA. In preparation of this, restoration of the painting was carried out.

The title of this thesis addresses the premise and at the same time the ethical guideline of the conservation-restoration. The goal of this restoration was to bring the painting back as close as possible to its original state. To discover the original appearance of the painting research was carried out. The underlying origin of several phenomena found during restoration was investigated. Hereby the following classification was made: are the found phenomena caused by something that is inherent to the technique of the artist, by the deterioration of the materials or by a later restoration? It is important to make a distinction between these causes, because this influences the choice of treatment.

Art historical information about the artist and the painting have been documented, with attention to the oeuvre of de Coter and the position of *The Lamentation* in this oeuvre. Little is known of Colijn de Coter, and only three signed paintings of him are known. *The Lamentation* is not signed but is generally accepted as a painting by the master. In the archives of the RMA information was found about an existing other version of this painting, owned by a private collector. The whereabouts of this painting was traced and it was brought to the studio, where it was subjected to a thorough investigation. If further research of this painting proves that it was made around the same time and in the same studio, much new information about the studio practice of Colijn de Coter can be gleaned.

The buildup of the different layers and the properties of the original materials have been addressed in order to find out how the artist actually made the painting. Knowledge of the used materials helps in assessing the condition of the painting and thereby influences the choice of treatment. On the basis of SEM-EDX and XRF analyses on *The Lamentation* several characteristics were established that may have been common practice in the studio of de Coter.

The overall condition of the painting is fair. The varnish has yellowed and in several areas previously applied discolored overpaint was found. Underneath these over-painted areas, old filling material and damaged original paint were discovered. During a previous restoration the painting has probably been over-cleaned, and as a result the paint is abraded.

Two phenomena were investigated in depth. Firstly, SEM-EDX and XRF analyses were carried out to investigate several small holes in the yellow and orange paint layers of the headdress of Mary Magdalene. Secondly, UV fluorescence has revealed the presence of a layer in several areas. From a GC-MS analysis it could be concluded that this layer was probably applied in a previous restoration. As the layer is hardly visible in daylight, and could not be removed without damaging the original paint, it was decided to leave it untouched.

The results of technical analyses and research of the other existing version of *The Lamentation* helped to determine the original appearance of the RMA painting. The distinction between technique, decay and restoration proved to be useful in the quest of Colijn de Coter and helped in determining the choice of treatment. Furthermore for the treatment of the RMA painting, the panel from Leersum proved to be of great help as well.

Acknowledgements
Rijksmuseum Amsterdam, M. Ubl (RMA), A. Wallert (RMA), J. van Iperen (RMA), K. Keune (RCE), M. Leeflang (Museum Catharijneconvent Utrecht), S. Laemers (RMA), mr. Stratenus, G. van Gerven (RMA), C. van Wijk (RMA), B. Stabik (SRAL), J. van Och (SRAL), I. van Rooy (Bonnefanten Museum Maastricht; BMM), C. Zijlstra (BMM), L. Hendrikman (BMM), M. Zeldenrust (RMA), H. van Keulen (RCE), A. Vandivere (UvA, RMA)
Alphabetical list of organizations and companies which are mentioned in the abstracts

- Amsterdam Museum (AM)
- Artemis UK
- Blue Tortoise Conservation London UK (BTC)
- Bonnefantenmuseum Maastricht
- Bureau voor Bouwhistorie en Architectuur-geschiedenis Utrecht
- Blijzondere Collecties UvA (BC)
- Brenntag Nederland/Lumilux
- CICRP Marseille
- Cornell University, Ithaca, New York USA
- Fablab Amsterdam
- Fablab Maastricht
- Flentrop Orgelbouw
- Frans Hals Museum (FHM)
- Harmony mine South Africa
- Hortus- en Meubilaircollege Amsterdam
- Hoving & Klusener V.O.F Amsterdam (HKA)
- Instituut Collectie Nederland (ICN, nowadays: RCE)
- J. Paul Getty Museum Los Angeles USA
- Kasteel Duivenvoorde
- Koninklijke Bibliotheek Den Haag
- Koninklijk Instituut voor het Kunstpatrimonium Brussels (KIK-IRPA)
- Koninklijk Museum voor Schone Kunsten Brussel
- Kröller-Müller Museum Otterlo
- Kunsthistorisches Museum Wien Austria
- LOPD, Grafische oplossingen voor de Archeologie
- Magister Varnish Products Hollandse Rading (MVP)
- Mauritshuis Den Haag (MDH)
- Monumentenzorg Hoorn
- Motivation BV Amsterdam
- Museum Boijmans van Beuningen Rotterdam (MBvBR)
- Museum Catharijnen Convent Utrecht
- Museum Rotterdam
- Museum van Loon Amsterdam
- National Museums Liverpool UK
- NCB Naturalis Leiden
- Nemoto Europe BV
- Norman Weiss Education Fund Student Scholarship
- Paleis Het Loo
- Premysla en Hamburger Amsterdam
- Radboud Universiteit Nijmegen
- Restauratie Atelier Amsterdam (RAA)
- Rice University, Houston, Texas USA
- Rijksdienst voor het Cultureel Erfgoed (RCE, formerly ICN)
- Rijksgebouwendienst Den Haag (Rgd)
- Rijksbureau voor Kunsthistorische Documentatie Den Haag (RKD)
- Rijksmuseum Amsterdam (RMA)
- Rijksmuseum Twenthe (RMT)
- School of Conservation Copenhagen Denmark
- Shell Nederland
- Shell Research Laboratories Amsterdam
- Shell Technology Centre Amsterdam
- Sint Pietershof Hoorn
- Stadsarchief Amsterdam
- Statens Museum for Kunst Copenhagen Denmark
- Stedelijk Museum Amsterdam (SMA)
- Stedelijk Museum Schiedam
- Stedelijk Museum voor Actuele Kunst (S.M.A.K.) Ghent Belgium
- Stichting de Fundatie van de Vrijvrouwe van Renswoude
- Stichting Restauratie Atelier Limburg (SRAL)
- Stichting Restauratie Atelier Limburg (SRAL)
- The Netherland-America Foundation
- University of Strathclyde Glasgow UK
- University of Delaware USA
- University of Arizona, Tucson, Arizona USA
- University Leiden (UL)
- University of California, Berkeley, California USA
- University of California, Pacific Grove, California USA
- University of Copenhagen (DK)
- University of Grenoble (France)
- University of Leiden (UL)
- University of Twente (UT)
- University van Amsterdam
- Van Gogh Museum Amsterdam (VGMA)
- Vereniging Hendrick de Keyser
- Winterthur Museum, Winterthur, Delaware USA
- Winterthur Museum, Winterthur, Delaware USA

Abbreviations of analytical techniques

- FTIR: Fourier-Transform Infrared Spectroscopy
- HPLC: High Performance Liquid Chromatography
- IRR: Infrared Reflectography
- GC-MS: Gas Chromatography-Mass Spectrometry
- PLM: Polarized Light Microscopy
- SEM: Scanning Electron Microscopy
- SEM-EDS: Scanning Electron Microscopy with energy dispersive X-ray spectroscopy
- SEM-EDX: Scanning Electron Microscopy with energy dispersive X-ray spectroscopy
- UV: Ultraviolet
- XRF: X-ray Fluorescence

Other abbreviations

- IC: Independent conservator-restorer
- C&R: Conservation and restoration of cultural heritage
- rio: restaurator in opleiding (conservator-restorer in training)
- PI: Post-Initial (= post-master part of the programme at the UvA)
- ICOM: International Council of Museums
Team C&R

Professors, lecturers and management
The recording and dating of 17th century marks on Flemish and Dutch panel marks.
An investigation into painting techniques seen in the context of ageing and conservation treatment with an emphasis on the long term effect of the keeping of the objects seen in relationship to current and future reception. An interdisciplinary research between conservator-restorers, conservation scientist and curators.


**Lecturers**

**Book and paper**

---

**Elizabet Nijhoff Asser**

*es.nijhoffasser@uva.nl*

1. Research in 19th century anatomical models of paper-mâché made by Docteur Auzoux.
4. RNA (Restoration Nijhoff Asser), conservator-restorer of paper, parchment and leather.

Vice-chair of the Belgium-Netherlands Society of Bookbindings.

---

**Jos Schrijen**

*j.j.j.schrijen@uva.nl*

1. Making an English-language thesaurus for describing bindings. This project is led by N. Pickwoad, Ligatus Research Centre, ccaW Graduate School, University of the Arts, London.

---

**Bas van Velzen**

*s.t.j.vanvelzen@uva.nl*

1. PhD-research (ongoing): ’Rendement par bac’; developing a simple procedure for the analysis of paper.
3. Author and/or editor of “Instructables” 4× per year in *IADA Journal of Paper Conservation*.

---

---
Ellen Jansen (MA|PD Res)  
e.m.jansen@uva.nl

1. Research into the properties and degradation processes of phosphorescent pigments. Research into the possibility of retouching gaps in phosphorescent paint.

Evelyne Snijders  
e.snijders@uva.nl

2. Independent conservator-restorer of contemporary art.

Drs. Sanneke Stigter  
s.stigter@uva.nl

1. PhD-research (ongoing): Between Concept and Material: The conservator’s role in photograph based and conceptual works of art: Ger van Elk, Joseph Kosuth, Jan Dibbets, as part of the interdisciplinary NWO funded research program New Strategies in the Conservation of Contemporary Art initiated by Maastricht University and RCE. Member of NeCCAR, Network for the Conservation of Contemporary Art Research, a three year nwo-funded international research network.
4. SBMK steering committee member – Foundation for the Conservation of Contemporary Art. Founding member of INCCA Education.
Kate van Lookeren Campagne BA
k.e.vanlookerencampagne@uva.nl

PhD research (ongoing): The technology of Dutch tin glazed tiles produced between 1580 and 1800 and its influence on glaze deterioration.

1. 17th century Dutch Tiles in the Tropics: the importance of state and trait on deterioration processes, ICOM-CC triennial meeting ceramic and glass group, SPA uitgevers, Amsterdam, 2013 (in press).
3. Coordinator local organizing-committee ICOM-CC C&G working group, triennial conference Amsterdam 2013.
Assistant coordinator ICOM-CC Ceramic and Glass Working Group (education).
Consultent Collectiewacht Gelderland.
Restauratieatelier van Lookeren Campagne.

Lisya Biçaçi
l.bicaci@uva.nl

Research (ongoing): Glass appliqué a multifaceted challenge. Conservation and restoration of architectural glass from the post-war period to the present.


Daan Blits
d.m.blits@uva.nl

Research to tile tableau of housing corporation De Key, Amsterdam Museum.

1. Independent conservator-restorer and guide in museums.
2. Independent conservator-restorer and guide in museums.
Drs. Daniëlle van Kempen  
d.vankempen@uva.nl

1 Research to 19th and 20th century decorated leather.  
2 Kempen, D. van, “Materiaal met een rijk verleden; restauratie van goudleer”.  
Cr. 3 (2006), pp. 19-22.  

Dr. ir. Mariël Polman  
m.g.polman@uva.nl

1 Van Doesburg-Rinsemahuis Drachten  
1 Specialist architectural paint research Cultural Heritage Agency of The Netherlands.

Tonny Beentjes  
t.p.c.beentjes@uva.nl

1 PhD-research (ongoing): Rodin’s “The Thinker”: the development and implementation of new conservation strategies and the investigation of bronze casting technology.  

Janine van Reekum MA  
j.e.vanreekum@uva.nl

1 The history and appearance of metal ornaments applied on the exterior of the Royal Palace in Amsterdam (not public).  
1 Independent metal conservator-restorer and advisor.
Mondrian in the Stedelijk Museum Amsterdam: Research and conservation of five early abstract paintings.


Freelance conservator-restorer at Cobra Museum voor Moderne Kunst Amstelveen.

Freelance conservator-restorer at ceiling paintings in the Trippenhuis Amsterdam.

PhD-research (ongoing): Consequences of wax-resin lining for the conservation and restoration of 17th century Dutch paintings on canvas.


Teaching adhesive principles to conservation students: sine scientia ars nihil est – without knowledge skill is nothing”. In Book. Adhesives and Consolidants in Painting Conservation: proceedings of the international conference held at the National Portrait Gallery, London, 6 May 2011.


Member core research team: Science 4 Arts Project “PAinT: Alterations in Time”.

Head of Education, sral.
icom-cc Sculpture, Polychromy and Architectural Decoration working group coordinator.

PhD-research (ongoing): ‘A perfect ground’ Historical recipes for preparatory layers for oil paintings in North West Europe 1550-1900. A critical analysis and recipe reconstructions.


**Ir. Sylvia Nijhuis**  
*s.m.nijhuis@uva.nl*

1. Ph.D. research (ongoing): Catholic liturgical textiles in The Netherlands: past, present and future. An investigation into the causes of change. The research aims to provide a basis for the cultural value assessment of this specific heritage.


3. Member of the Committee of Research Complaints Restauratoren Nederland. Member Group Paramentica (http://paramentica.wordpress.com).

**Herman den Otter**  
*h.denotter@uva.nl*


---

**Drs. René Lugtigheid**  
*d.o.r.lugtigheid@uva.nl*

1. PhD research (ongoing): Catholic liturgical textiles in The Netherlands: past, present and future. An investigation into the causes of change. The research aims to provide a basis for the cultural value assessment of this specific heritage.


3. Member of the Committee of Research Complaints Restauratoren Nederland. Member Group Paramentica (http://paramentica.wordpress.com).

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**Lecturers**

**Wood and furniture**

---

**Lecturers**

**Textiles**

---

**Ir. Sylvia Nijhuis**  
*s.m.nijhuis@uva.nl*

1. Frames and their restoration, the frame as an independent work of art, 2009. Tripartite research into original transparent coatings (or varnished) on furniture in The Netherlands between 1600-1940. Partnership between RMA, RCE and UvA.


3. Nijhuis Houtrestauratie, independent enterprise for the purpose of conservation and restoration of wooden and gilded objects. Regularly employed as a restorer at RCE.

---

**Herman den Otter**  
*h.denotter@uva.nl*

1. Frames and their restoration, the frame as an independent work of art, 2009. Tripartite research into original transparent coatings (or varnished) on furniture in The Netherlands between 1600-1940. Partnership between RMA, RCE and UvA.


---

**Drs. René Lugtigheid**  
*d.o.r.lugtigheid@uva.nl*

1. PhD research (ongoing): Catholic liturgical textiles in The Netherlands: past, present and future. An investigation into the causes of change. The research aims to provide a basis for the cultural value assessment of this specific heritage.


3. Member of the Committee of Research Complaints Restauratoren Nederland. Member Group Paramentica (http://paramentica.wordpress.com).

---

**Lecturers**

**Wood and furniture**

---

**Lecturers**

**Textiles**
Other lecturers

Dr. Marjolijn Bol
Technical art history
m.a.b.bol@uva.nl

The Impact of Oil: A history of oil painting in the Low Countries and its consequences for the visual arts, 1350-1550 (nwo-project Utrecht University, University of Amsterdam and the Rijksmuseum).


Researcher at Max Planck Institute for the History of Science, Berlin.

Drs. René Hoppenbrouwers
Paintings conservation-restoration; preventive conservation
hoppenbrouwers@sral.nl

Safety in church buildings.


Director sral.
ICOM-CC Working Group Education and Training in Conservation, assistant working group coordinator.
European Network for Conservation-Restoration Education (ENCORE), vice-chair.

Dr. René Peschar
Science Consultant (esp. chemistry)
r.peschar@uva.nl

Research (ongoing): Famille Noire porcelain: stylistic and technical analysis.
Fakes and forgeries in ceramics.


Independent editor on the subject of ceramics.
Advisor to the Board of the Dutch Ceramics and Glass Society.
Member of the Oriental Ceramic Society.

Drs. Ink de Pree-Dommisse MA
Art History, specialism the history of ceramics
p.m.depree-dommisse@uva.nl

1 Research (ongoing): Famille Noire porcelain: stylistic and technical analysis.
3 Independent editor on the subject of ceramics.
Advisor to the Board of the Dutch Ceramics and Glass Society.
Member of the Oriental Ceramic Society.
Management

Drs. Angèle Goossens
Coordinator continuing education
a.t.f.p.goossens@uva.nl
History of Art student uva (part-time)

Drs. Suzanne Maarschalkerweerd
Programme-manager
s.l.j.maarschalkerweerd-dechamps@uva.nl

Rosa Hoogenboom
Secretary continuing education
pe-CenR@uva.nl
History of Art student uva

Drs. Inge Tinbergen
Programme-coordinator
i.l.tinbergen@uva.nl

Hanna de Lange
Secretary
secretariaat-C&R@uva.nl
History student uva (part-time)
Alumni Overview alumni
<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Disciplines</th>
<th>MA Thesis Title</th>
<th>Year of MA Graduation</th>
<th>Current Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marya Albrecht</td>
<td><a href="mailto:marya.albrecht@live.nl">marya.albrecht@live.nl</a></td>
<td>-</td>
<td>Klein maar fijn. Loodwit in fijne deeltjesgrootte.</td>
<td>2012</td>
<td>rio (UvA)</td>
</tr>
<tr>
<td>Stephanie Avril</td>
<td><a href="mailto:post@stephanieavril.eu">post@stephanieavril.eu</a></td>
<td>-</td>
<td>De Heilige Agnes. Een schilderij met pressbrokat uit de Noordelijke Nederlanden.</td>
<td>2011</td>
<td>rio (UvA)</td>
</tr>
<tr>
<td>Roosmarijn van Beemen</td>
<td><a href="mailto:rmcvanbeemen@gmail.com">rmcvanbeemen@gmail.com</a></td>
<td>-</td>
<td>Lijmmethoden in de restauratie van gipsen afgenomen van antieke schilderijen.</td>
<td>2011</td>
<td>rio (UvA)</td>
</tr>
<tr>
<td>Sophie de Beaufort</td>
<td></td>
<td>-</td>
<td>Klein maar fijn. Loodwit in fijne deeltjesgrootte.</td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>Sanne van Bergenheugouwen</td>
<td><a href="mailto:svbergenheugouwen@gmail.com">svbergenheugouwen@gmail.com</a></td>
<td>-</td>
<td>De collectie van Breitner en de kleuren van Standage.</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Nienke Besijn</td>
<td><a href="mailto:nienkebesijn@gmail.com">nienkebesijn@gmail.com</a></td>
<td>-</td>
<td>Een lichtje laten schijnen over UV-lijmen. Een onderzoek naar het gebruik en veroudering van vier UV-lijmen voor toepassing binnen de glasrestauratie.</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Julia van den Burg</td>
<td><a href="mailto:julia.vandenburg@gmail.com">julia.vandenburg@gmail.com</a></td>
<td>-</td>
<td>The hand of a Master; technical research into the paintings of Jacob Backer (1608/09-1651).</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Melissa Daugherty</td>
<td><a href="mailto:m.e.daugherty@hotmail.com">m.e.daugherty@hotmail.com</a></td>
<td>-</td>
<td>Dilemma’s in de restauratie; handreiking voor de restauratie van schilderijen met latere toevoegingen die bijdragen aan de identificatie van de geportretteerde.</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Tamar Davidowitz</td>
<td><a href="mailto:tamardavidowitz@gmail.com">tamardavidowitz@gmail.com</a></td>
<td>-</td>
<td>Painted silver; the use of colour on the Merkel table piece.</td>
<td>2011</td>
<td>Junior metal conservator-restorer at Rijksmuseum Amsterdam.</td>
</tr>
<tr>
<td>Hannie Diependaal</td>
<td><a href="mailto:J.M.S.Diependaal@uva.nl">J.M.S.Diependaal@uva.nl</a></td>
<td>-</td>
<td>De schilderkist van Breitner en de kleuren van Standage.</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Nadine Faber</td>
<td><a href="mailto:nadine.faber@gmail.com">nadine.faber@gmail.com</a></td>
<td>-</td>
<td>-</td>
<td>2010</td>
<td>Visual artist</td>
</tr>
</tbody>
</table>

*This alumnus received his/her Master's degree after completing the course in Conservation and Restoration at the (former) ICN. His/her qualifications are equivalent to graduates that have completed the UvA PI program. See pages 7 and 8 for more information about MA and PI.
Femke van der Knaap
femkevanderknaap@gmail.com
- Discipline Paintings
- MA thesis title Luiten Kuiper, de praktijk van een restaurator.
- Year of MA graduation 2011
- Current activities: Freelance conservator-restorer of painted surfaces

Marjolein Koek
marjoleinkoek@hotmail.com
- Discipline Textiles
- MA thesis title Behandeling van vergelging in struisvogelveren; onderzoek naar de oorzaak van vergelging en mogelijke reiniging van struisvogelveren als onderdeel van een kostuum.
- Year of MA graduation 2012
- Current activities: Freelance conservator-restorer of painted surfaces

Jorinde Koenen
j.koenen@uva.nl
- Discipline Paintings
- Year of MA graduation 2012
- Current activities: Freelance conservator-restorer of painted surfaces

Kim Mulder*
k.mulder.1984@gmail.com
- Discipline Book and paper
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Laura Koster
laurakoster103@gmail.com
- Discipline Wood and furniture
- MA thesis title Onderzoek naar de restauratiegeschiedenis van de zeventiende-eeuwse Zeeuwse kap.
- Year of MA graduation 2012
- Current activities rio (UvA)

Alexandra Nederlof
alexan_ned@hotmail.com
- Discipline Book and paper
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Suzanne van Leeuwen
suzanneleeuwen@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Julia Leunge
julia.leunge@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Suzanne van Leeuwen
suzanneleeuwen@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Femke van der Knaap
femkevanderknaap@gmail.com
- Discipline Paintings
- MA thesis title Luiten Kuiper, de praktijk van een restaurator.
- Year of MA graduation 2011
- Current activities: Freelance conservator-restorer of painted surfaces

Marjolein Koek
marjoleinkoek@hotmail.com
- Discipline Textiles
- MA thesis title Behandeling van vergelging in struisvogelveren; onderzoek naar de oorzaak van vergelging en mogelijke reiniging van struisvogelveren als onderdeel van een kostuum.
- Year of MA graduation 2012
- Current activities: Freelance conservator-restorer of painted surfaces

Jorinde Koenen
j.koenen@uva.nl
- Discipline Paintings
- Year of MA graduation 2012
- Current activities: Freelance conservator-restorer of painted surfaces

Kim Mulder*
k.mulder.1984@gmail.com
- Discipline Book and paper
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Laura Koster
laurakoster103@gmail.com
- Discipline Wood and furniture
- MA thesis title Onderzoek naar de restauratiegeschiedenis van de zeventiende-eeuwse Zeeuwse kap.
- Year of MA graduation 2012
- Current activities rio (UvA)

Alexandra Nederlof
alexan_ned@hotmail.com
- Discipline Book and paper
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Suzanne van Leeuwen
suzanneleeuwen@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Julia Leunge
julia.leunge@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)

Suzanne van Leeuwen
suzanneleeuwen@hotmail.com
- Discipline Metal
- MA thesis title Het etsen van zilver, technologie, toepassing en herkenning.
- Year of MA graduation 2011
- Current activities rio (UvA)
Arie Pappot*                                               a.pappot@rijksmuseum.nl
Discipline Metal ■ MA thesis title Lokale behandeling van bronspent; met natriumesquisulfocarbonaatoplossing. ■ Year of MA graduation 2011 ■ Current activities Junior metal conservator-restorer at Rijksmuseum Amsterdam

Jean Marijke Poot
jeanmarijke@hotmail.com

Koosje Ruijgrok
koosjeruijgrok@gmail.com
Discipline Book and paper ■ MA thesis title Het restaureren van de Enkhuizer librije; ethiek en esthetiek binnen een restauratieproject. ■ Year of MA graduation 2009 ■ Current activities Independent entrepreneur: 2Krestore Textile Restauratie

Martin Posthuma de Boer
mposthuma.deboer@gmail.com

Daphne Reijs
dreijs@hotmail.com

Willianne van der Sar
williannedv@hotmail.com

Elisa Schöne
info@elisaschonekunsten.nl

Joni Steinmann
jmisteinmann@gmail.com
Discipline Textiles ■ MA thesis title ‘Majestueus & Hemels’ Negentien-de eeuwse blauwe kleurstoffen in de Rijksmuseum kastuumcollectie. Vroege kleurstoffen in kostuums; onderzoek naar de staat van textiel in relatie tot de kleurstof. ■ Year of MA graduation 2011 ■ Current activities río (UvA)

Hinke Sigmond
hinkesigmond@gmail.com
Discipline Historic interiors ■ MA thesis title Spreekend verleden, bron voor de toekomst; de toepassing van or al historie in historische binnenuitbouwen en de restauratiegeschiedenis van de jaren 70. ■ Year of MA graduation 2011 ■ Current activities rio (UvA)

Hilde Schalkx*
hildegastalkx@gmail.com

Lisa Steyn
liseysteyn@gmail.com

Saskia Smulders- de Jong
smuldersdejong@gmail.com
Discipline Wood and furniture ■ MA thesis title Chemische beitsen; een onderzoek naar de lichtechtheid en identificatie van drie metaalzout-beitsen op eikenhout. ■ Year of MA graduation 2010 ■ PI thesis title Besluitvorming rondom een Koninklijke Toilettafel: een omvangrijke restauratie van een Italiaans meubel uit de 19de eeuw van gezaagd hout en ingelegd met natuursteen. ■ Year of PI graduation 2012 ■ Current activities Junior furniture conservator-restorer at the Rijksmuseum Amsterdam
<table>
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<tr>
<th>Name</th>
<th>Email</th>
<th>MA/PI thesis title</th>
<th>Year of MA/PI graduation</th>
<th>Current activities</th>
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<td>Marijke Top</td>
<td><a href="mailto:topmarijke@gmail.com">topmarijke@gmail.com</a></td>
<td>□ Discipline Glass, ceramics and stone □ MA thesis title Chinees porselein en de kunst van het lijmen. Een onderzoek naar de versnelde volkomenes van broklijmen.</td>
<td>2011</td>
<td>□ Current activities rio (UvA) □ Year of MA graduation 2011</td>
</tr>
<tr>
<td>Tamara Venema</td>
<td><a href="mailto:tvvenema@hotmail.com">tvvenema@hotmail.com</a></td>
<td>□ Discipline Wood and furniture □ MA thesis title De boekenkasten in de bibliotheek van het Rijksmuseum □ Year of MA graduation 2010 □ PI thesis title restauratie van een commode.</td>
<td>2010</td>
<td>□ Current activities □ Year of PI graduation 2012 □ Current activities □ Restauratie aan een commode □ Year of MA graduation 2011</td>
</tr>
<tr>
<td>Boudewien Westra</td>
<td><a href="mailto:lwosten@hotmail.com">lwosten@hotmail.com</a></td>
<td>□ Discipline Wood and furniture □ MA thesis title Onderzoek naar de oriëntatie van de afwerklaag op de ladekast in het Jachthuis van Pieter van der Werff □ Year of MA graduation 2012 □ PI thesis title Onderzoek naar de oriëntatie van de afwerklaag op de ladekast in het Jachthuis van Pieter van der Werff □ Year of MA graduation 2012 □ Year of PI graduation 2012 □ Current activities □ Year of PI graduation 2012 □ Current activities □ Onderzoek naar de oriëntatie van de afwerklaag op de ladekast in het Jachthuis van Pieter van der Werff □ Year of MA graduation 2012 □ PI thesis title Onderzoek naar de oriëntatie van de afwerklaag op de ladekast in het Jachthuis van Pieter van der Werff □ Year of MA graduation 2012 □ Year of PI graduation 2012 □ Current activities □ Year of PI graduation 2012 □ Current activities</td>
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<td>Anna Zwagerman</td>
<td><a href="mailto:annazwagerman@gmail.com">annazwagerman@gmail.com</a></td>
<td>□ Discipline Historic interiors □ MA thesis title Sandstone, marble and paint: an investigation into the history of the walls and vaulted ceilings of the main public spaces in Amsterdam's former Town Hall, with a side note to Atlas’sprera □ Year of MA graduation 2009 □ PI thesis title Conservation \ Access: Conservation for access at Penrhyn Castle, Wales; visitor impact on the physical condition of a 19th century National Trust Property □ Year of PI graduation 2011 □ Current activities □ Year of PI graduation 2011 □ Current activities □ Sandstone, marble and paint: an investigation into the history of the walls and vaulted ceilings of the main public spaces in Amsterdam's former Town Hall, with a side note to Atlas’sprera □ Year of MA graduation 2009 □ PI thesis title Conservation \ Access: Conservation for access at Penrhyn Castle, Wales; visitor impact on the physical condition of a 19th century National Trust Property □ Year of PI graduation 2011 □ Current activities □ Year of PI graduation 2011 □ Current activities</td>
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**Additional Notes:**
- Year of MA/PI graduation indicates the year the student graduated from their Master’s or Postgraduate program.
- Current activities provide insights into their present work or research.
- The disciplines mentioned indicate the areas of expertise or focus.
Colophon

Publication
Faculty of Humanities, Conservation and restoration of cultural heritage

Compilation and editing
Angèle Goossens

Editing summary’s
René Peschar

Design
Anke Broeren

Photography

Press
Lecturis bv, Eindhoven

Binding
Hexspoor bv, Boxtel

Edition
500

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