Vol. 12 (2011) – No. 1

Journal of PaperConservation

IADA Reports IADA Mitteilungen der IADA e.V.

Hilde Schalkx et al

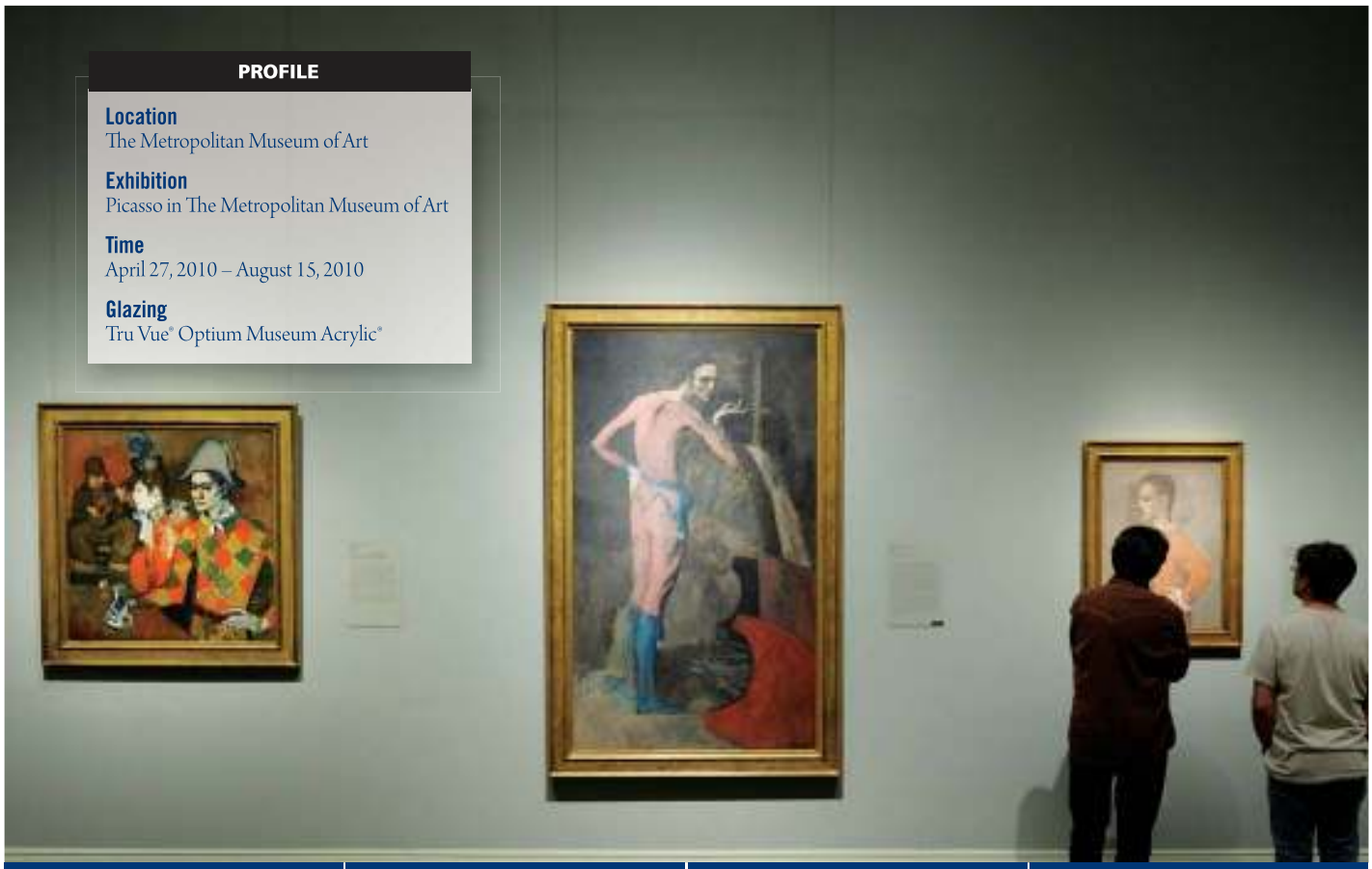
Aqueous Treatment of Water-Sensitive Paper Objects

Aurélie Martin et al

Local Strenghtening of Mould-Damaged Manuscripts

Preliminary Programme of XII IADA Congress Berne 2011 / Vorläufiges Programm XII IADA Congress Bern 2011

IADA2011 XII[th] International Congress • Berne



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Journal of PaperConservation

IADA Reports Mitteilungen der IADA e.V.

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> **U4 above left** Document clamped with magnets: side view. > pp 34/35

> **U4 above right** Folger phase box housing the rare volume of Ben Johnson's works, 1616. Photo: Renate Mesmer. > pp 32-34

> **U4 below left** Local consolidation procedure combining re-sizing, infilling and lining. > pp 21-29

> **U4 below right** General view of a paper dress designed by Paco Rabanne after its conservation treatment. © INP / G Vanneste. > pp 39/40

EDITORIAL

Birgit Reissland & Wolfgang Seidel

Alea iacta est—The dice has been cast | Ein neuer Neuanfang

Dear IADA Members and Colleagues,

The year 2011 marks important changes in the history of the 'Journal of Paper Conservation - IADA reports / IADA Mitteilungen' (JPC). Throughout the last year IADA's board started to inform you on intended changes to our journal. In this editorial I would like to share some insight into these changes and what they mean for you.

At the end of December 2010 our contract with the publishing house FotoText Verlag Wolfgang Jaworek expired. Therefore in December 2009 IADA's board had to decide if the contract would be prolonged unchanged for four more years, or if we should take the opportunity to make some changes. We decided for the latter.

The most obvious change is the language of the journal. All issues will now be published in English. We realized that a bi-lingual journal is not feasible within our current structure. Based on our mission to facilitate the international exchange of professional knowledge between book and paper conservators, IADA's board members acknowledged that effective communication is only possible across national boundaries. Sharing ideas requires the use of a language that most of our readers have in common: English. Keeping in mind that for most of us English is not our native language, we all face similar problems. However, I think it is worth the effort. The increasing number of international colleagues joining IADA supports us.

The second crucial change concerns our responsibilities for the journal's content. Thus far, IADA was only in charge of the peer-reviewed, scientific papers. Now we will be responsible for the entire journal. This will allow publishing relevant, non-scientific articles that focus on skill transfer 'instructables', new materials and equipment, exchange of ideas 'in practice', and inform about ongoing projects and Master's degrees. We have expanded our editorial board already, but invite readers to support us by joining our board or contributing content.

From 2011 onwards, JPC will be published by the Verlag und Redaktionsbüro Dr Wolfgang Seidel. IADA is pleased to continue working with Wolfgang Seidel and bid a fond farewell to Wolfgang Jaworek (pp 6/7). *The committee trusts that these changes will have tangible benefits for our members. At our congress in Bern, we will have time to discuss these changes. I am looking forward to meeting you in Bern!*

Birgit Reißland
Editor in chief of JPC

Liebe IADA-Mitglieder, liebe LeserInnen,

mit dieser Ausgabe des „Journal of PaperConservation" ist der Wechsel komplett vollzogen: Ab 2011 wird die Zeitschrift ausschließlich englischsprachigen Inhalt haben. Anfang 2009 war ein erster Schritt getan, indem der Titel „Journal of PaperConservation" den alten Zeitschriftennamen „PapierRestaurierung" ablöste, der bis dahin neun Jahre Bestand gehabt hatte. Damit wird die Entscheidung der IADA-Mitgliederversammlung auf dem Wiener Congress 2007 umgesetzt, verstärkt auf Internationalität zu setzen.

Weitere Veränderungen gehen damit einher: Nach bislang geteilter inhaltlicher Verantwortung zwischen der IADA und dem Fototext Verlag Wolfgang Jaworek ist nun die IADA alleiniger Herausgeber des Magazins. Und ich trete mit meinem Verlag in die Fußstapfen des Verlages von Wolfgang Jaworek, der die Zeitschrift mitbegründet und dann entscheidend mitgeprägt hat. Ohne Wolfgang Jaworek und seinen großen Idealismus hätte sie nicht die hohe Qualität und gelungene Mischung unter ständiger Auffrischung an interessanten Inhalten erreicht.

Im Sommer 2001 war ich in Wolfgang Jaworeks Verlag eingetreten. Durch meine Tätigkeit als Leiter des Fotoarchivs der Staatlichen Schlösser und Gärten Baden-Württembergs war ich mit der Materie Fotografie und den Problemen in Archivierung, Konservierung und Restaurierung dieses Kulturgutes und den diesbezüglichen Aufgaben bereits vertraut. So war es für Wolfgang Jaworek ein Leichtes, mich für das gesamte faszinierende Gebiet der Papierrestaurierung zu begeistern und mich mit der Verlagsarbeit in all ihren Facetten vertraut zu machen. Diese neuneinhalb Jahre haben durch seine Lehre, Freundschaft und Förderung unschätzbaren Wert für mich. Großer Dank gebührt ihm, denn sein Handeln stets im Interesse der Leserinnen und Leser, seine konstruktive, schnelle Auffassungsgabe, sein glasklarer Blick für die zentralen Fragen und seine Entscheidungsfreude werden immer richtungsweisend für mich bleiben.

Als der IADA-Vorstand vergangenes Jahr mit der Frage auf mich zukam, die Verlegerschaft der Zeitschrift zu übernehmen, war meine Antwort schnell klar, diesem Wunsch zu entsprechen. Das in mich gesetzte Vertrauen weiß ich sehr zu schätzen, und ich werde alles daran setzen, mein Bestes zu geben. So freue ich mich auf eine langjährige Zusammenarbeit und auf das Wiedersehen mit der IADA-Familie im Spätsommer in Bern!

Dr. Wolfgang Seidel
Verleger, Verlag und Redaktionsbüro Dr. Wolfgang Seidel

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New Year—New Beginning

The increasingly international membership of IADA in recent years, and its new joiners in 2010 in particular, has further enhanced IADA's professional profile. In order to stay abreast of these changes, the current committee has reviewed the communication strategy at a meeting in Berlin in February 2010. We believe that the 'Journal of PaperConservation' is at the center of our communications, and at the same time the pillar of our main mission: the exchange of knowledge. We have therefore taken the opportunity to review the contract with our long-standing publisher, the FotoText Verlag Wolfgang Jaworek, which was due to expire at the end of 2010.

Many things had changed over the years, not least the name of the journal itself, but also our need for a more international outlook and some very fundamental changes in the way people seek and retrieve information nowadays: the world wide web and the possibility to find information any time from anywhere in the world. We see the developments in information technology as an opportunity, and want to make sure that time-sensitive information, such as conference calendars and job ads gets to our members in time, while information of more lasting value, such as peer reviewed articles and practical tips relevant for the field of paper conservation should remain in print.

At the same time, we have listened to the feedback of our members. Some feel overwhelmed at the thought of writing an article for a peer reviewed journal with all its many changes and the often challenging feedback one gets. And still, we have some very active members, who are willing to share their experiences with a wider audience. These contributions might not involve any scientific research, but we found that this kind of information is highly valued by our readers.

The committee therefore has carefully evaluated future needs and decided to embark on a new contract with a new publisher. Our search did not lead us far. We were very fortunate to secure the services of Wolfgang Seidel, who has worked for our journal since its inception and is therefore no stranger to the work of IADA. The new contract was signed by André Page on behalf of IADA and Wolfgang Seidel as our new publisher in the presence of the entire editorial board on 4 February 2011 in Berne. So 2011 begins with a new publishing contract (Fig 1), and the committee hopes that IADA members find the changes we will make over the coming months to reflect the needs of our professional community. We, from the IADA committee, are certainly very pleased with this outcome.

At this point it remains for IADA to thank Wolfgang Jaworek for all the support he gave IADA over the years. We would not be where we are today without him (pp 6/7)!

Anna Bülow, London

1 A. Page (left) and W. Seidel (right) signing the new publishing contract in Berne. Photo: A. Bülow.

2010 in (Financial) Numbers

Thanks to prudent calculations and planning, IADA has by and large retained its financial assets in 2010. At this point, we would also like to thank all those members who have paid their membership fees for 2011 already in 2010! Timely payments really do help our voluntary work as well as our bank account a great deal by avoiding us having to send out reminders and thus increasing necessary administration time.

We, like most charities, sustain ourselves through membership fees. We generally do not aim to generate income through conferences, however we do have to make estimates before-

IADA - CONGRESS BERNE 2011

XIIth International IADA Congress, CH-Berne, 29 August - 2 September 2011

Preliminary Program / *Vorläufiges Programm*

> Pages 8/9
> www.iada-online.org/berne.html

Summary of all Income and Expenditure in 2010 (in EUR)*	
Income	
Membership Fees 2009	188.00
Membership Fees 2010	41,370.90
Membership Fees 2011	12,367.00
Balance Prague Conference 2010	506.63
Total Income	**54,432.53**
Expenditure	
Bank Account Management	93.00
'Journal of PaperConservation' (Vol 11, No 1-4)	39,659.67
IADA Website	1,655.32
Charity Registration	2,162.71
Miscellaneous Costs	563.81
E.C.C.O. 2009	2,508.00
Committee Meetings	2,817.46
Total Expenditure	**49,459.97**
Difference (surplus 2010)	**4,972.56**
Amount brought forward from 2009	106,011.92
Sum at 31.12.2010	110,984.48
Minus cash assets as of 31.12.2010	– 628.88
Total Assets as of 31.12.2010	**+ 110,355.60**

hand on how many people will attend, how many of those will be IADA members and can attend at a discount, and set that against the projected costs of the conference. The conference in Prague has been a great success, and we are pleased to have achieved this aim without any loss, but leaving us with a very slight plus. Our greatest expenditure has been the production of the 'Journal of PaperConservation', which we see as the main focus of our work. In addition, we had to spend some money on registering IADA as a charity in 2010; and although we aim to hold committee meetings on occasions where we meet anyway, there are still travel and accommodation costs.

The committee met twice last year. The executive committee met in February 2010 in Berlin to discuss our future communication strategy, taking into account our membership structure, IADA's aim to facilitate the exchange of knowledge, and the changing nature of information dissemination through modern technology. The full committee met in Prague on occasion of the conference. There was one additional meeting of the editorial board in Copenhagen in October 2010. However, it so happened that all attending members were in Copenhagen for the ICOM-CC Graphic Documents Conference anyway and thus were sponsored by their respective employers. Making the most of opportunities! We will invest last year's plus of almost 5,000 EUR in exchanging knowledge and skills amongst our members through the Journal of PaperConservation, the Website, and future conferences, such as our upcoming congress in Berne in September 2011.

Julia Bispinck, Berlin

Preparations for Berne 2011

By the time this issue goes to print, the IADA committee will have met in Berne to pursue the organisation of the congress in more detail. A committee meeting took place between 4-6 February 2011. We looked at the congress facilities to reassure ourselves that building work has been completed. Looking at the venue is also important for technical reasons. The congress will be bilingual English/German, so we need to ensure we have the space and the facilities to accommodate at least two professional translators; furthermore we inspected the presentation facilities to help us give appropriate guidelines for our presenters. As ever, the devil will be in the detail: from bags over logo and lunch to the very fundamental issues such as the timing of events, sponsors and organisation of the workshops. Further information about the committee meeting will be published in the June issue of the JPC.

A preliminary programme for the week has already been set (pp 8/9) and promises to provide the audience with interesting and thought provoking presentations. A novelty in this year's congress will be our offer to IADA members to attend various workshops, enabling delegates to learn new skills hands-on. As places for workshops will be limited, early registration in recommended.

IADA will also hold its general members assembly during the week. We will be looking to elect new members to the committee and are therefore looking for enthusiastic and creative IADA members to support the work of the association. Some particular functions within the committee will need to be filled (JPC, Vol 11 [2010], No 4, pp 4/5). If you have energy and are interested in shaping the future of IADA, please contact André Page <andre.page@nb.admin.ch>. *Anna Bülow, London*

New Members

Gerd Crona (Sweden)

In 1982, when I worked temporarily in an industrial bindery in Gothenburg, my interest in studying traditional handicraft bookbinding arose. I attended a bookbinding training programme at 'Leksands folk- högskola', Sweden, followed by a three year apprenticeship at different bookbinding studios. In 1987 I joined the book and paper conservation department at the University Library of Uppsala, and in 1989 I began working at the Military Archives as a book conservator. In 1990 I finished my bookbinding master exam and over the years I have also attended a number of different conservation courses.

During the last 15 years the core business of the Military Archives conservation work has moved its focus from book conservation towards conservation of maps, prints and drawings. This large collection of maps and plans contains mainly objects executed on paper but also works on parchment. Apart from this area my special fields are preservation as well as exhibition planning and book conservation.

Gerd Crona, Military Archives/Swedish National Archives, Banérgatan 64, 115 88 Stockholm, Sweden, gerd.crona@riksarkivet.se


Marion Verborg (USA)

After receiving a science-based 'Baccalaureate', I studied medicine during a three year programme before reorientating myself towards Art History. This led me to the field of preservation and conservation, and I subsequently graduated from the Conservation of Cultural Property course of the University Paris 1 - La Sorbonne, with a specialisation in paper conservation, in September 2010. I am currently working on a publication about light bleaching (topic of my thesis), and stain classification. In order to enhance my practical experience, I did several internships during the last year of my studies: I worked at the Picasso foundation in Malaga managing the creation of storage areas; the Philadelphia Museum of Art carrying out treatments; the Deutsches Historisches Museum in Berlin preparing exhibitions; and finally at the Albertina Museum in Vienna.

I am very interested in hands-on conservation as well as in scientific projects and research. I am now a fellow at the Conservation Center for Art and Historic Artifacts (CCAHA) in Philadelphia, USA, which is a wonderful studio where almost 40 people are working on paper, photo and book conservation and preservation. I work on different kind of objects such as drawings, posters, watercolours, maps, and intend to do some research, too. I became an IADA member recently in order to be a part of a conservation group where I could share experiences and information.

Marion Verborg, Mellon Fellow, 264 S. 23RD Street, Philadelphia, PA 19103, Tel +1-215-545-0613, Fax +1-215-735-9313, mverborg@ccaha.org, marionverborg@hotmail.fr

Wolfgang Jaworek—A Critical Supporter of IADA

It was in 1999, at the IADA Congress in Copenhagen, that IADA decided to withdraw from the contract with Callwey Publishing after some vigorous discussions amongst its members. The creation of our own publication, in co-operation with the FotoText Verlag Wolfgang Jaworek, was suggested. In Wolfgang Jaworek we had found the perfect publisher for our needs at the time and many years of successful co-operation followed.


1 A successful team of editors and publishers, Vienna 2007: Wolfgang Seidel, Anna Bülow, Birgit Reissland, Wolfgang Jaworek (left to right).

First Steps

During the following board meeting in Leipzig (November 1999), the new concept of IADA's publication was discussed and on 1 February 2000 the first issue of 'PapierRestaurierung - Mitteilungen der IADA' was published. In the beginning, the journal was printed six times a year, 16 pages thin, with a yearly supplement for peer-reviewed papers.

But Those Were Eventful Times ...

Only just evolving, the journal was already at risk as the German conservation associations decided to merge to form VDR. As one of the major consequences of this fusion, all individual journals were to be joined into one journal; and that would have been the end of our rising publication. In December 2000, far-reaching decisions had to be made: as soon as it was clear that IADA —with its definite international membership— would not join the German conservation associations, IADA had to re-establish itself. It was now more than ever an independent, international association of paper conservators and other interested professionals. In order to set up a better forum for the readers to cross-fertilize their ideas, IADA and the FotoText Verlag decided to enhance the publication and developed a new concept.

Sustainable Cooperation

On 1 March 2002, the first issue of the renewed 'PapierRestaurierung' was published. Containing 48 pages, it combined the former news part with the supplement. The responsibilities were shared—IADA was in charge of the scientific part, FotoText Verlag Wolfgang Jaworek was responsible for the ongoing news. Many years of successfully publishing peer-reviewed articles, practical information, conference calendars, book reviews, and much more followed. The results proofed us correct: an ever increasing number of IADA-members from non-German speaking countries forced us to review our strategy once again.

At the general members meeting in Vienna in 2007, members reached the conclusion that IADA should take a more international outlook by providing publications in English. At the time, it seemed feasible to us to publish in both German and English. However, experiences of multi-lingual countries such as Switzerland and Canada soon proved to us that a completely bilingual is beyond our voluntary and financial capacities. In February 2010, the executive committee therefore came together in Berlin to discuss, and decided on a new communication strategy. Subsequently, and as first manifestation of our resolve for more internationality, the journal got an English title 'Journal of PaperConservation - IADA reports | Mitteilungen der IADA'.

Farewell

In 2011, the paths of IADA and the publishing house now are splitting to allow IADA to pursue its ambition to be at the heart of paper conservation within Europe and beyond. Following and translating the wish of our members for an international direction expressed in Vienna, we need to live up to our promises both in terms of language and content. We were fortunate to secure the services of Dr Wolfgang Seidel, who has worked for both the 'PapierRestaurierung' and the 'Journal of Paper-Conservation' for many years and is poised to take up the challenge.

Thank You

At this point, it remains for us to thank Wolfgang Jaworek. We have left the contract with him with very mixed feelings. He has been one of our strongest supporters over the years and has taught us much of his field. Wolfgang Jaworek supported us through the difficult times of the fusion of the German Conservators' Associations and he helped us to develop and publish a print publication that has become more and more popular and is widely recognised as one of the few peer-reviewed paper-conservation journals worldwide. He helped us to grow and now we can move on in order to further the international exchange of knowledge, IADA's main mission. Wolfgang Jaworek has been there in the background, sometimes in the foreground. He has been pivotal in making IADA what it is today. We would not be where we are without his commitment and dedication to IADA.

... und nun haben sich doch noch einige deutsche Worte in diese Ausgabe der Zeitschrift hineingeschmuggelt:

Lieber Wolfgang,
insbesondere Dein reges kulturpolitisches Interesse, Dein aufrechtes, staatsbürgerliches Engagement für die Erhaltung von Kunst- und Kulturgut auf Papier, Deine fachübergreifende Dialogbereitschaft, Deine private Unterstützung unserer Zeitschrift – oft weit über das Notwendige hinaus –, sowie Deine kritischen Anmerkungen werden uns sehr fehlen. Wir danken Dir, unserem langjährigen Verleger.

Der Vorstand der IADA: André Page, Alexander Aichinger, Julia Bispinck, Dr Anna Bülow, Renate van Issem, Renate Mesmer, Birgit Reissland, Dr Veronique Rouchon, Ritsuko Schuster-Ishii, Birgit Vinther Hansen

Preliminary Programme / *Vorläufiges Programm*

28 August - 2 September 2011

University of Berne, Auditorium /
Universität Bern, Hörsaalgebäude
Fabrikstrasse 6
3012 Berne, Switzerland
3012 Bern, Schweiz

Congress language / *Kongress-Sprache*

English and German with simultaneous translation. / Englisch und Deutsch mit Simultan-Übersetzung.

Sunday, 28 August 2011

16.00-20.00: Registration / *Anmeldung*

20.00: Informal Meeting / *Informelles Treffen*

Monday, 29 August 2011

08.00-09.45: Registration/Anmeldung

10.00-10.30: Welcome/Grussworte
Representatives (CH, IADA)

10.30-11.00: Opening Lecture / *Eröffnungsvortrag*

Andrea Giovannini (CH): *'Quid non mortalia pectora cogis, auri sacra fames?'—An alternative tendering procedure for conservation projects*

11.00-11.45: Coffee Break / *Kaffeepause*

11.45-12.45: Lectures / *Vorträge*

Debra Evans (USA): *Making books stand up and stand out—New methods of displaying books in an upright format*

Barbara Korbel (DE): *Mounting unglazed paper objects—Preparing the permanent exhibition at the German Historical Museum Berlin*

Aurelia Streri (FR): *Mounting papyri—The papyri collection of the Islamic Department at the Louvre Museum*

12.45-14.00: Lunch Break / *Mittagspause*

14.00-14.30: Short Presentations / *Kurzvorträge*

Marieluise Lindner (DE): *Metamorphose figures—A specific form of trick puppets made of cardboard—A conservation concept for the stock of puppets from the puppet string theatre collection Dresden*

Magdalena Grenda (PL): *Image reintegration of paper-based artefacts—The conservation-restoration of two large-size film posters*

Jonas Palm (SE): *Are safe standards safe?*

Judith Ries(CH): *Wallpaper restoration—Strategies and technical implementation of in-situ conservation*

Gayane Eliazyan (AR): *Metal-covered Armenien treasure bindings—Problems caused by stiff metal plaques at spine and front*

14.30-15.30: Lectures / *Vorträge*

André Page (CH): *Author's libraries—Conserving another type of language*

Henk Porck (NL): *Value-based decision making in paper conservation*

Matthias Frankenstein (DE): *Large scale treatment concepts for conservation and restoration of archival records*

15.30-16.15: Coffee Break / *Kaffeepause*

16.15-17.15: Lectures / *Vorträge*

Gabriela Grossenbacher (CH): *Owner's stamps in library documents*

Eva Glück (DE): *KUR-Project architectural plans of the Hans Scharoun Archive—Conservation and technical analysis of 4.500 architectural drawings and photo-reproductions*

Wiebke Findeisen (DE/FI): *Conservation and digitisation of over 9000 parchment leaves—A case study how we handled the mass*

17.15-17.30: Announcements / *Ankündigungen*

20.00: Welcome Drinks / *Eröffnungsempfang*

Tuesday, 30 August 2011

09.00-10.30: Lectures / *Vorträge*

Aurelie Martin (FR): *Local strengthening of mould damaged manuscripts—A case study on logbooks of early French expeditions in Louisiana (1684-1722)*

Eliza Jacobi (NL): *Ten reasons why ink corrosion repairs fail—Optimize your local mending strategy*

Véronique Rouchon (FR): *Possibilities offered by anti-oxidant charged interleaves to prevent iron gall ink damages on the paper*

Frank Ligterink (NL): *The Ink Corrosion Predictor—A novel tool to support conservation treatment decisions*

10.30-11.15: Coffee Break / *Kaffeepause*

11.15-12.15: Lectures / *Vorträge*

Véronique Rouchon (FR): *Water and alcohol based treatments performed on iron gall ink manuscripts—Assessment of migration risks*

Silvia Sotigu (IT): *Wet conservation treatments of graphic art on paper—A new technique based on a rigid polysaccharide gel of gellan gum*

Anne-Claire Poulpiquet (FR): *Starch pastes—Comparative study of three starches, wheat (Zin Shofu®), tapioca and arrowroot, through mechanical tests*

12.15-12.45: Film / *Film*

Sigrid Eyb-Green, Doris Müller-Hess (AT): *Dialogues on Gustav Klimt—A film about the course of a conservation process*

12.45-14.00: Lunch Break / *Mittagspause*

14.00-15.00: Lectures / *Vorträge*

Antje Potthast (AT): *Analysis of copper-ion degraded paper—Study on parameters for the preparation of sample materials to evaluate selected treatments*

Christa Hofmann (AT): *Verdigris—Applying the results of analysis to the conservation of copper-ion degraded paper*

Jasna Malesic (SI): *The development of paper stabilization method—Preliminary results on artificial ageing of paper samples with transition metal ions*

15.00-15.30: Short Presentations / *Kurzvorträge*

Anne-Claire Poulpiquet (FR): *Ageing of cellulose with salt and oxidative oil—The use of size-exclusion chromatography to evaluate cellulose degradation*

Wiebke Findeisen (DE): *Protection systems for seals from medieval and modern times—Effects on seals and today's treatment including conservational, historical and ethical aspects*

Ariyoshi Masaaki (JP): *Preparation of bamboo paper appropriate for restoration—Practical attempt following the Chinese traditional papermaking method*

Tomoko Kawamura (JP): *Treatment of Teshigahara Sofu's (1900-1979) Calligraphy—A non-traditional intervention with regard to Japanese traditional materials and techniques*

15.30-16.15: Coffee Break / *Kaffeepause*

16.15-17.30: Lectures / *Vorträge*

Martin Strebel (CH): *Passive climate control*

Claude Laroque (FR): *Development of a method for characterization and identification of Asian papers and establishment of an historical and technical database*

Henk Porck (NL): *Decorated Paper—What's in a Name?*

Andreas Gruber (AT): *Investigation into the technology of the Austrian photographer Heinrich Kühn (1866-1944)*

Wednesday, 31 August 2011

09.00-10.00: Lectures / *Vorträge*

Maja Sandahl (DK): *Micro fading on digital prints—Advantages and disadvantages*

Birgit Vinther Hansen (DK): *Light mapping—A tool for planning of exhibitions in the library buildings to avoid colour changes*

Birgit Reissland (NL): *Deep Purple? Visualizing the alarming low lightfastness of Crystal Violet Inks*

10.00-10.30: Short Presentations / *Kurzvorträge*

Stefan Blankenborg (NL): *Deacidification and strengthening of acidified books and documents—Polymer strengthening of acidified paper*

Michal Durovic (CZ): *Bookkeeper deacidification—Influence to stability of modern recording media*

Guido Voser (CH): *Dynamic Vacuum Freeze Drying—Possibilities and Limits*

Engel, Patricia (AT): *European research centre for book- and paper conservation restoration—A new opportunity*

10.30-11.15: Coffee Break / *Kaffeepause*

11.15-12.45: Lectures / *Vorträge*

Petra Vavrova (CZ): *Latent Danger of Post-irradiation Effects for Lignin Containing Paper*

Marion Verborg (USA): *Light bleaching—Investigation of various effects on different properties of several old papers*

Giovanna di Pietro (CH): *Pollution Pathway Method—A new method to evaluate the effect of indoor air pollution on the loss of value of paper-based collections*

Hildegard Homburger (DE): *Glassine paper as problem during the conservation treatment of a drawing by Johannes Hendrik van den Broek—Expansion behaviour and translucence as the main difficulties*

12.45-14.00: Lunch Break / *Mittagspause*

14.00-14.30: Short Presentations / *Kurzvorträge*

Emmy de Groot (NL): *The care to protect—Conservation of the secondary linen covers on parchment archival bindings from the 17th century*

Rebekka Schulz (DE): *'The Dresden Corvine'—A method to infill losses of parchment*

Jedert Vodopivec (SI): *Book conservation—Analyses and conservation of a 16th century Kreutterbuch*

Susanne Lorenz (DE): *Celluloid as a historical material for book bindings—Study of a prayer booklet of Steinbrener*

Maria Geba (RO): *Medieval manuscripts in the Romanian Cultural Heritage—Research and preservation*

14.30-15.30: Lectures / *Vorträge*

Kristina Blaschke (CH): *Lubricants on vegetable-tanned leather—Effects and chemical changes*

Karin Eckstein (DE): *The Bamberg Psalter and its binding—An ethical consideration*

Jiři Vnouček (DK): *Imperfections of parchment in manuscripts—Practical parchment making as an aid for understanding the origin of the defects and the behaviour of parchment*

15.30-16.00: Coffee Break / *Kaffeepause*

16.00-18.30: IADA members' assembly / *IADA-Mitgliederversammlung*

20.00: Evening Reception / *Abendempfang*

Thursday, 1 September 2011

09.00-10.30: Lectures / *Vorträge*

Carmen Effner (CH): *Influence of the Papersave Swiss Procedure on ink corroded paper*

Agnes Blüher (CH): *Papier deacidification, not mass deacidification—Selection and procedure In the Swiss Literary Archives*

Antje Potthast (AT): *Fifteen years later—Study on the sustainability of mass deacidification: Practical implications*

Manfred Anders (DE): *The ZFB:2 Process—A new and especially mild mass deacidification process based on calcium carbonate*

10.30-11.15: Coffee Break / *Kaffeepause*

11.15-12.45: Lectures / *Vorträge*

Degree works / *Diplomarbeiten*

Monika Stokowiec (UK): *Conservation of a 17th century iron gall ink corroded Coptic Manuscript*

Sofie Laier Henriksen (DK): *Preservation and Long-term Accessibility of Digital Content*

Catherine Bouvier (AU): *Conservation of a large-scale family tree on parchment—Possibilities and limitations*

Elodie Remazeilles (FR): *Blurring the boundaries between textile and paper—The conservation of paper dresses by Paco Rabanne*

12.45-14.00: Lunch Break / *Mittagspause*

14.00-15.00: Degree works / *Diplomarbeiten:* Collapse of the Historical Archive of the City of Cologne—Single item treatment

Sandra Munck (DE): *Broken endbands in book conservation—Comparing different conservation techniques*

Anna Ventura (DE): *Technical examination and Conservation of a Psalter-Lectionary by the 'Master of the Book of Hours of Eva of Nassau'*

Celine Weyland (DE): *Separating and smoothing interlocked parchment pages—Conservation of the 'Schreinsbuch' (late 18th century)*

15.00-15.45: Coffee Break / *Kaffeepause*

15.45-17.15: Lectures / *Vorträge*

Lara Speroni (UK): *Developing methods for conserving early stationery bindings—A parchment device to extend sewing supports*

Agnes Adam (AT): *Conservation of parchment—Compensation of losses in manuscripts and on parchment bindings*

Leïla Sauvage (FR): *'Powder and Paper'—Conservation of friable media drawings*

Olivier Fleygnac (FR): *The conservation project of a large globe from the 'Musee Buffon' (Montbard, France)—The use of gelatine as a protective under layer for the re-varnishing of the globe*

17.15-17.45: Closing remarks / *Schlußworte*

Friday, 2 September 2011

Workshops (only for IADA members) / *Workshops (nur für IADA-Mitglieder)*

English (without translation) / *Englisch (ohne Übersetzung)*

10.00-13.00 and / *und* 14.00-17.00:

Birgit Reissland, Frank Ligterink (NL): *How would you treat this and ... why? Risk-based decision making for ink corroded objects* (EUR 40.00)

Eliza Jacobi, Claire Phan Tan Luu (NL): *Mending of cracks in untreated ink-corroded objects - including new tools to control your work quality* (EUR 80.00 incl 'how to' package)

Simonetta Iannuccelli, Silvia Sotigu (IT): *Aqueous treatment of sensitive paper objects—A new methodology applying gellan gum, a rigid polysaccharide gel* (EUR 70.00)

Round-table discussion / *Podiumsdiskussion:* Eliazyan, Gayane (AR): *Armenian manuscripts—Metal covers, metal fittings and fastenings*

Site Visits / *Werkstattbesuche:* We organize visits to conservation studios in Bern, and other interesting sites. They will be announced at <www.iada-online.org>. / *Wir organisieren Besuche von Restaurierungswerkstätten und Ausstellungen in und um Bern. Diese werden auf der IADA-Website <www.iada-online.org> bekanntgegeben.*

Registration / *Anmeldung*

Online registration will start soon, please check our website <www.iada-online.org>. IADA members will be informed by email. / *Die Online-Anmeldung ist demnächst möglich. Bitte schauen Sie auf unserer Website <www.iada-online.org> nach. IADA-Mitglieder werden umgehend per E-mail informiert.*

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* The prices include an evening reception. / Der Abendempfang ist im Preis mit inbegriffen.

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PERSONALIA

OBITUARY

Merryl Huxtable (1956–2010)

Merryl Huxtable died on October 16th, 2010. Following training in conservation at Lincoln College and Gateshead Technical College, Merryl worked as a freelance paper conservator. In 1981, she joined the Victoria and Albert Museum (V&A), in London. In 1996, she was instrumental in the re-design of the new Paper and Book Conservation studio. She was a founding member of the Wallpaper History Society, established in 1986. In 1998, she helped to set up the MA course in Historic Wallpaper Conservation for the RCA/V&A Conservation programme in conjunction with the National Trust.

I would like to express my memories of Merryl as well as reflections by some of her friends and colleagues. Like many colleagues and friends, we were extremely saddened to learn of Merryl's death.

In 2001, I was an intern in the V&A's Paper Conservation studio and Merryl was my supervisor. She was a generous tutor; always willing to share her time and give advice. She assisted me with technical and practical issues and intellectual and ethical decision making, giving me the self-confidence to undertake complex treatment. My internship at V&A became one of my most memorable experiences in my career.

In London, Sally Esdaile, a friend and colleague also reflected on Merryl's generosity, her willingness to share knowledge and as a reliable port of call for advice. She recalled how she enjoyed bringing people together and her love to arrange dinner parties where there were opportunities to introduce her conservator friends to each other. She made many friendships this way and was responsible for many ongoing connections across the conservation world.

In Paris, Silvia Brunetti, a close friend and colleague since 1982, remembered projects they had worked on together, in Paris and Avignon, and many phone calls and discussions about conservation treatments and deontology. Amélie Couvrat Desvergnes, who was an intern at the V&A mentioned that she will always remember Merryl for being highly professional, kind, and compassionate.

Merryl was a dedicated, knowledgeable and gifted conservator. She will be greatly missed both professionally and personally by those who had the privilege of knowing her.

(The content of this text was shared and written by Merryl's friends and colleagues. Special acknowledgments for Amélie Couvrat Desvergnes, Silvia Brunetti, Sally Esdaile and Pauline Webber.)

Valeria Orlandini
Paper Conservator in Private Practice,
in Chevy Chase, Maryland

Hilde Schalkx, Piet Iedema, Birgit Reissland, Bas van Velzen

Aqueous Treatment of Water-Sensitive Paper Objects

Capillary Unit, Blotter Wash or Paraprint Wash?*

Blotter washing and washing with the capillary unit are both methods used for aqueous treatment of water-sensitive paper objects. The challenge of this treatment is to remove water-soluble products while keeping the water-sensitive medium in its place. In this article the two methods are compared, along with a third method referred to as Paraprint washing. This is a washing treatment similar to blotter washing, but using Paraprint OL 60, the viscose non-woven fabric recommended in the literature for use with the capillary unit, instead of blotting paper. Preliminary experiments were carried out to clarify the principles behind the capillary unit treatment, and the method was adjusted to use a level surface instead of the slight slope recommended in the literature. The comparison between the different methods was made by washing samples of new, unaged papers, that had been coloured by immersion in a highly water-soluble red food colouring dye (Ponceau 4R) to simulate the water-soluble compounds like discolouration and acids that washing is usually meant to remove. After treatment the samples were compared visually. Both capillary unit treatment and Paraprint washing gave better results than the more traditional blotter wash. The capillary unit worked well with papers that wet easily. For papers that did not, Paraprint washing was better suited as it washed out the colour more effectively and evenly. Finally, originals were successfully treated applying the results of this study.

Kapillarreinigung, Blotter-Wash oder Paraprint-Wash? Wässrige Behandlung von wasserempfindlichen Objekten

Das „Blotter-Washing" und die „Behandlung mit der Kapillareinheit" sind beides wässrige Methoden zur Behandlung wasserempfindlicher Objekte. Die Herausforderung besteht darin, wasserlösliche Produkte zu entfernen, dabei jedoch die wasserempfindliche Bildschicht auf dem Träger zu erhalten. In diesem Artikel werden diese beiden Methoden sowie eine Abwandlung des Blotter-Washings, das „Paraprint-Washing", verglichen. Hierzu wurden neue, ungealterte Papiere wässrig behandelt. Um den Transport unsichtbarer wasserlöslicher Verunreinigungen (Verfärbungen, Säuren) sichtbar zu machen, waren diese Papiere zuvor mit einem wasserlöslichen, roten Lebensmittelfarbstoff (Ponceau 4R) durch Tauchen gefärbt worden. Nach der Behandlung wurden die Proben visuell verglichen. Die Kapillareinheit und das Paraprint-Washing erzielten bessere Ergebnisse als das eher traditionelle Blotter-Washing. Eine Behandlung mit der Kapillareinheit ist effektiver für Papiere, die Wasser gut aufnehmen. Für schlecht benetzbare Papiere ist das Paraprint-Washing geeigneter, die Farbe wurde besser und gleichmäßiger entfernt. Schließlich wurden Originale unter Berücksichtigung der Ergebnisse dieser Studie erfolgreich behandelt. Die Verwendung der Kapillareinheit konnte durch einleitende Experimente wesentlich vereinfacht werden: ein geneigter Winkel ist nicht notwendig.

Washing, i.e. applying aqueous treatment to paper objects (usually without the use of surfactants or other additives), has a firm place in paper conservation and is performed regularly in a lot of conservation studios. Since washing is intended to remove water-soluble components, washing of paper objects containing water-sensitive media presents a challenge for paper conservators. Some objects may contain media that dissolve immediately upon contact with water or change their morphological characteristics (Fig 1). Others may contain a binder which becomes water-soluble after prolonged contact with water, or when agitated, but is otherwise quite stable. Paper that is severely degraded, has a lot of tears, or is very thin can also be regarded as water-sensitive, because it is vulnerable to mechanical stress and would suffer from the movement of the water when subjected to immersion washing. Therefore, in this article the term 'water-sensitive objects' is used for objects that can tolerate a limited amount of water, whether because of their media or physical condition. Objects that are at an immediate risk of bleeding are not suitable for the aqueous treatments discussed here.

There are several washing methods designed to minimize damage during aqueous treatment of water-sensitive objects. While 'blotter washing' is widely applied [1], another technique is recommended in the literature—treatment using the 'capillary unit' (Fig 2). Until now, comparisons have been made between blotter washing and several other washing techniques like immersion washing, and between the capillary unit treatment and immersion washing, but not between the two methods themselves. The question remained how effective the methods are in comparison and which of the methods should be preferred, if any.

1 Water-sensitive media: a sample of paper with blue gouache paint during immersion washing. The loss of pigments is clearly visible.

This question is complicated by the fact that there is not much published on the working principles of these washing methods. Blotter washing is a common treatment but is not well investigated and the few publications on blotter washing often lack details on how the blotter wash was executed. This is problematic as there are many variant methods of blotter washing. The capillary unit treatment has been studied fairly recently, but some aspects of this method still remain unclear. Therefore preliminary experiments were done to improve understanding of the underlying mechanisms. These experiments led to the addition of a third washing technique to the comparison: a method similar to blotter washing using Paraprint OL 60 (GMW Gabi Kleindorfer), the same viscose non-woven fabric as used in the capillary-unit treatment, instead of blotting paper. This method will be referred to as 'Paraprint washing'.

Background

Quite a lot is published on the subject of aqueous treatment of paper in general. Chapter 16, 'Washing', of the Paper Conservation Catalog (Maynor 1990) gives a practical overview of the factors to consider when washing paper and provides step-by-step procedures for different application techniques. It also gives a bibliography of the most important literature regarding the subject until then. Keyes (Keyes 1994) focuses on practical methods for treating water-sensitive objects and gives very useful suggestions for gradual moistening. A more in depth look at the mechanisms of transfer of soluble substances involved in paper washing is provided by Lienardy and van Damme (Lienardy and van Damme 1990). Since then, several articles have been published further discussing the parameters that come into play during washing. Most notable is the series of articles by Daniels and Kosek (Kosek 2002, 2004a, 2004b) that look into the influence of temperature, treatment duration, wetting and washing method. The results from their first experiment (Kosek 2002) suggest that the different washing techniques are equally effective if carried out long enough. Their later experiments (Kosek 2004b) show that blotter washing can result in movement of discolouration to the recto of the object. This is not surprising, as the technique was unfortunately carried out in such a way that the surface of the object was the driest part of the system, causing upward transport of moisture. The results are therefore not applicable to the type of blotter wash chosen for our experiment, where evaporation of moisture from the surface is very limited. The effect of washing on paper strength is discussed by Vitale (Vitale 1992) and Moropoulou and Zervos (Moropoulou and Zervos 2003) amongst others. These studies emphasize that although washing is often seen as a beneficial procedure, it is a radical treatment, altering the properties of the paper, and in some cases decreasing its strength. Several publications focus specifically on the influence of washing on water-sensitive media and the factors influencing the stability of media. Daniels (Daniels 1995) gives a very clear account of the factors influencing the wash-fastness of watercolours. He discusses how certain pigments can cause cross-linking of gum arabic, rendering it less soluble, but also mentions the influence of the paper surface and pigment particle size. Clarke (Clarke 1998) goes into the movement of several specific watercolour pigments in response to different washing techniques. Daniels (Daniels 1998) shows how even very gentle aqueous treatment with ultrasonic mist causes pastel pigments to agglomerate. The relation between discolouration and acids removed from an object during washing is the subject of a study by Uchida et al (Uchida et al 2007). This study shows that when discolouration is no longer observed to move out of an object, this does not necessarily mean all removable acids have been removed. Some specific acids require a lot of water to be washed out, placing blotter wash at a disadvantage compared to immersion washing. However, when an object cannot be immersion washed, the outcome that immersion washing is more effective than blotter washing is irrelevant. Furthermore, the blotter wash was carried out for the same amount of time as immersion washing, making the comparison questionable. It is unknown whether longer treatment duration would yield better results for blotter washing, but it seems probable that it would.

2 The treatment of a sample of blotting paper on the capillary unit. The red dye simulates the water-soluble degradation products that washing is meant to remove.

These and other published experiments often compare application techniques that can be used for aqueous treatment of water-sensitive paper objects like blotter wash with immersion treatments that bear too much risks to be applicable for this specific group of objects. Therefore such studies are not directly applicable for treatment decisions regarding water-sensitive paper objects. The aim of the present study was to compare three application techniques that are suitable for treating water-sensitive objects and to recommend a technique that is effective while having acceptable side effects.

Capillary Unit Treatment

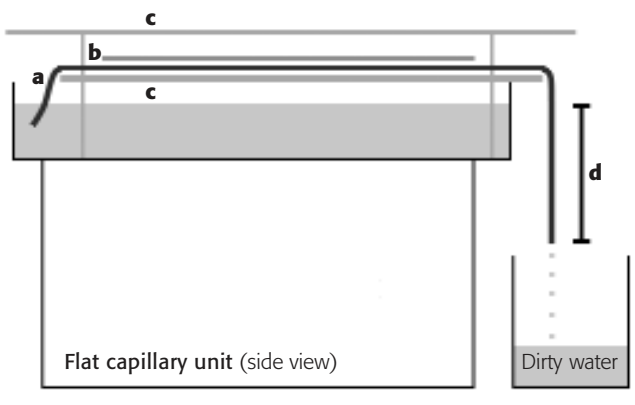
The capillary unit was developed by Peter Zajicek and Derek Tinwell at the State Library of South Australia and was introduced to the conservation field through a short article in 'Paper Conservation News' (Chantry 1993). It became better known when Susanne Kirchner (born Tiemer) published the results of her final thesis written at the Cologne University of Applied Sciences (Kirchner 2001). In the capillary unit treatment, the

object is placed on a layer of absorbent material acting as a water reservoir. One end of the material takes up clean water from a container, the water travels up a slope, and at the other end, the dirty water drips down out of the material (Fig 2, 3). In this way, water moves continually from one end of the material to the other. Solutes that migrate from the object into the absorbent material are transported actively out of the system. The unit is covered to limit evaporation from the surface. The capillary unit is called a unit because in the literature the reservoir and slope were shaped in one piece out of Perspex.

Assuming that the slope of the capillary unit is an important factor in operation, Kirchner investigated the effects of varying angles for the slope used and recommends a slope of 2°. She also found the most suitable absorbent material, examined the effect of different washing solutions and compared the influence of the capillary unit treatment on water-sensitive paint layers with that of immersion washing. She proposed the use of Paraprint OL 60, a 0.5 mm thick white viscose non-woven fabric used in various industries (for example for wet filtration and in medical applications), which has since then been adopted in conservation practice [2]. Kirchner attributes the observed water flow up the slope of the capillary unit and down again to capillary action, but does not explain the mechanism fully. So what role does capillarity play exactly? This is an important question as capillarity even lends its name to the capillary unit. In order to better understand the functioning of the capillary unit, the occurring transport mechanisms will be described here in detail.

Wetting the Paraprint OL 60

First, the pores of the dry fabric need to be filled with water. This can be done by spraying, immersing the Paraprint OL 60 in water or simply laying it in place on the capillary unit as described below. The Paraprint OL 60 takes up the water by capillarity. Capillarity or capillary action is the phenomenon by which a liquid will travel up higher in thin tubes (capillaries) than the surrounding liquid level. This is caused by a combination of cohesion and adhesion forces. Capillarity also occurs in porous materials like paper and Paraprint OL 60, where the pores can be regarded as capillaries. Once the porous material is saturated or the point is reached where gravity is equal to the capillary forces, equilibrium between capillary forces and gravity is established. At this point a driving force for further upward movement no longer exists and the water uptake stops. Therefore, in the capillary unit treatment, capillarity enables water to move into the material, but it is not the driving force of the water flow.



3 Schematic drawing of the modified capillary unit treatment (side view). Used papers: Paraprint OL 60 **(a);** object **(b);** acrylic glass **(c);** height difference **(d).** The height difference between the water level and the hanging end of the fabric is responsible for the water flow through siphoning.

Establishing a Water Flow within the Paraprint OL 60

The next step is to create a water flow within the Paraprint OL 60 material. To establish that, one end of the Paraprint OL 60 is placed in a container with fresh water, while the other end is hanging down, reaching a level that is lower than the water level of the fresh water (Fig 2, 3). This set up works as a siphon, which is similar to the principle of communicating vessels. The water level of the clean water container will seek the same level as the lowest hanging end of the Paraprint OL 60, in this way establishing the water flow through the material. It is necessary to provide enough clean water, since the water flow will stop when the clean water is used up and the system will dry out.

The driving force for the water flow is the difference in height between the two (Fig 3: d), causing a hydrostatic head or pressure column. Initial flow experiments allowed to determine parameters that influence the amount of water flowing through the absorbing material (Schalkx 2010). Increasing the height difference d, either by lengthening the hanging end of fabric or raising the water level, increases the pressure and results in faster water transport.

The water flow is caused by the height difference, but at the same time, friction within the Paraprint OL 60 capillaries causes resistance against the flow. The longer the fabric, the more resistance occurs. The length of fabric hanging beneath the water surface also counts in this respect.

At a given flow velocity equilibrium is established between the driving force and the flow resistance. Lengthening the hanging end of the fabric only increases water flow up to a maximum value. Above a certain length of fabric the water flow decreases. This has not yet been fully explained but may be related to changes in the shape and friction characteristics of the capillaries [3].

Adjusting the angle of the slope, as Kirchner did, automatically influences the height difference d, causing a change in the water flow. However, the slope itself is of no influence and was therefore changed to a level surface, simplifying the set up (Fig 3 [4]).

Another way to increase the amount of water transported per minute through the capillary unit is by placing more layers of Paraprint OL 60 on top of each other.

Moistening the Object

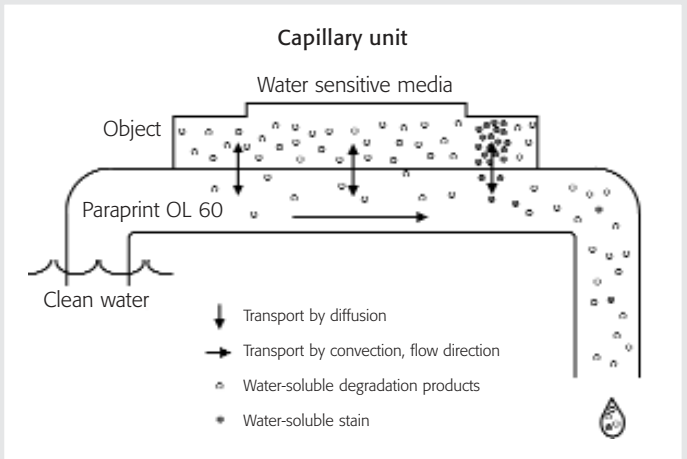
The dry object needs to be humidified before the actual washing process, so the paper expands and can be laid flat. This is done by spraying or pre-conditioning in a humid environment. The water absorption again is due to capillary forces until all pores are filled or an equilibrium with the water content of the surrounding air is established. The humid object is then placed on the Paraprint OL 60, from which it will take up more water if not

completely humidified already. If there are stains present, the object should be positioned in such a way that they are farthest from the clean water uptake if possible (Fig 4). Once the capillaries in the paper are filled with water, water-soluble components start to slowly dissolve and spread randomly through wet areas. This process is called diffusion. To enable transport by diffusion across the interface between object and Paraprint OL 60, it is very important to have close contact between the paper and the Paraprint OL 60. Any air bubbles will result in uneven washing or even staining. It is likely that the object expands further as it wets completely during the treatment, in which case it will need to be repositioned to ensure close contact.

Transport of Solutes out of the Object into the Paraprint OL 60

The aim of washing is to remove water-soluble discoloured or harmful components out of an object. In the capillary unit treatment, this transport is realized by diffusion [5]. Transport by diffusion is driven by a solute-concentration gradient. The initially high solute concentration in the object decreases, while the solute concentration in the Paraprint OL 60 increases until an equilibrium is reached. The process is slow, since it depends on a passive, random movement of solute molecules. For this reason, the time it takes for a solute molecule to travel a certain distance will increase exponentially with the distance.

So what does this mean exactly? During washing, particles in the paper and in the Paraprint OL 60 will move back and forth randomly. When the water is clean, the particles moving into the paper will be water, while the particles moving back are water as well as the solutes. When the concentration in both is equal, there will still be movement of particles (diffusion), but this will not result in cleaning, as the same amount of particles, i.e. both solutes and water, will move into the paper as out of it. By refreshing the water in the Paraprint OL 60, the solutes are removed from the system and the concentration difference is restored. Transport by diffusion will then slowly decrease the concentration difference again and more solutes will move out of the object. Refreshing the water is therefore vital to washing. In the capillary unit, this is done automatically and continually.



4 Transport in the capillary unit treatment by diffusion and convection.

Transport of Solutes Through the Paraprint OL 60

The siphoning action of the capillary unit allows a constant fresh water flow through the Paraprint OL 60 fabric. Solute molecules that pass the interface are transported away from the object by this water flow, which is called transport by convection (Bird et al 2001). Transport by convection is much faster than by diffusion. The water that transports the solutes finally leaves the Paraprint OL 60 by dripping down into the container for dirty water.

Covering the Capillary Unit

To limit the evaporation of water through the surface of the Paraprint OL 60 and the object into the surrounding air, the capillary unit is covered with a transparent material like acrylic sheet (Perspex). Evaporation from the surface would possibly create an upward transport of solutes. Alternatively, during treatment the object can be moistened from above by spraying or using ultrasonic mist.

It is assumed that higher speed of water flow through the capillary unit results in faster washing, but this has not been studied here.

Since the water flow is established by siphoning action, 'siphon washing' would be a more accurate term for this application technique. However, to avoid confusion, the term 'capillary unit treatment' will be maintained here.

Blotter Washing

Blotter washing is the aqueous treatment of paper on one or (usually) more layers of wet blotting paper. The blotting paper serves as a water reservoir. The more layers of blotting paper, the more water can be added. The object is placed on the blotting paper and left for a certain time, during which soluble substances will migrate out of the object into the blotting paper. The blotting paper is then replaced with new blotting paper and the cleaning process repeats itself (Maynor 1990: 435). Changes of the wet blotting paper are usually continued until no solutes are observed in the blotting paper or, in the case of invisible solutes, until they are expected to be entirely removed.

This method can be varied upon almost endlessly. The blotting paper can be more or less saturated with water, the changes can be made at varying intervals, the whole process can be carried out in a tray that is covered by acrylic sheet to keep the object from drying out, water can be added from above by misting or spraying, a support layer can be used for the object to enable easy blotter changing, et cetera. Sometimes a screen-printing screen is used as a rigid support.

The type of blotter wash chosen for the present study is a covered blotter wash on a screen-printing screen (Fig 5). The screen-printing screen makes it much easier to change the blotting paper without risk to the object. It seems that blotter washing on a screen-printing screen is more effective than without one, which can probably be explained by the fact that the screen provides more water to the object, because the spaces filled with water are larger than the pores in blotting paper [6].

Wetting the Blotting Paper

The dry blotting papers are moistened by spraying or immersing them in water. They absorb water by capillary action until the pores are filled with water. They are then placed on a suitable flat surface or in a flat tray. In our experiments a piece of thick felt covered by Melinex was used below the blotting paper. This helps to make close contact between the blotting paper and the object, especially when using a (weighted) screen-printing screen. The screen is placed on top of the blotting paper.

Moistening the Object

Several methods of humidification can be applied to wet a water-sensitive object, for instance by spraying or placing it in a humid environment. Again, the water uptake is realized by capillarity until the pores are filled or an equilibrium with the surrounding air is established. Soluble products start to dissolve and move at random within the object due to diffusion. The humid object is then placed on the screen directly above the blotting paper.

Covering the Blotter-Wash Container or Screen-Printing Screen

By covering the blotter-wash container or screen with a transparent material like Perspex, the risk of the object drying out is reduced, eliminating the need to moisten the object from above. More on this below.

Transport of Solutes out of the Object into the Blotting Paper

The blotting paper acts as a water reservoir. Compared with the capillary unit treatment, blotter washing is a static system without an active water flow. As long as the blotter wash is covered, the blotting paper and the object form a predominantly closed system until the blotting paper is changed. The transport of solutes through the object/blotter interface takes place by diffusion. As explained above, solutes from the contaminated object and clean water molecules from the blotter move back and forth randomly until the concentration reaches an equilibrium between object and blotter. Further cleaning requires refreshing the water. This is realized by changing the blotting paper (Fig 6).

Changing the Blotters

By exchanging the contaminated blotters with blotters that contain clean water, the concentration of solutes in the blotter is reduced to zero, creating a new concentration difference. Transport by diffusion will slowly reduce the concentration difference again as more solutes will leave the object. Frequent changing of the blotting paper is crucial, as it would take too long to wait for a concentration equilibrium in the whole of the blotting paper.

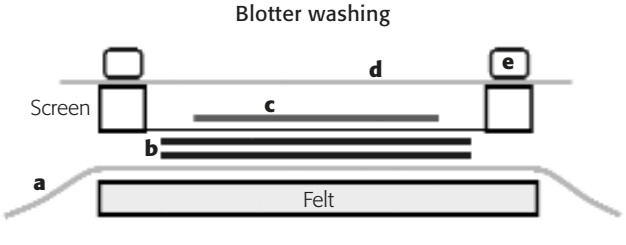
When lifting the object from the blotting paper, suction is created, causing additional movement of water and solutes into the blotter. A similar suction occurs in float screen washing when the screen is lifted (Stirton 1987: 4). This is thought to improve the cleaning action as well. Placing the object on a screen-printing screen instead of directly on the blotter has the advantage that changing the blotters requires less handling of the object. This is safer and faster.

Keeping the Blotter-Wash Container Uncovered

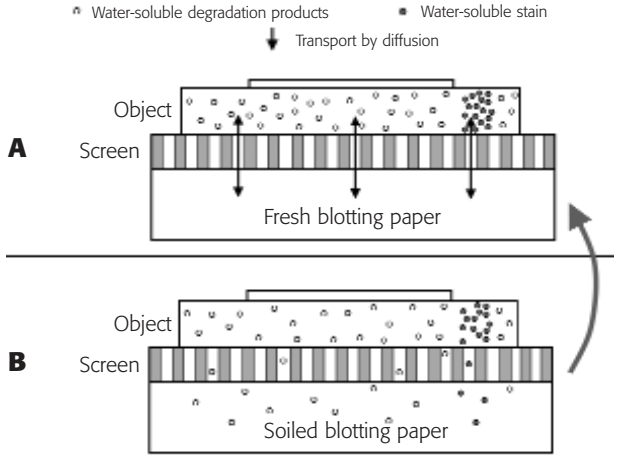
When the blotter wash container is left uncovered, evaporation interferes with the washing principles. In this case, washing by diffusion is aided by capillarity. As the water evaporates especially at the edges of the blotting paper, water is drawn by capillarity from the moist object, taking solutes with it. A brayer can be used to press water out of the edges of the blotting paper to create extra suction. Water continuously evaporates from the edges of the blotting paper into the surrounding air, but also from the surfaces of object and blotter. Solutes therefore will not only be transported into the blotting paper, but also to the surface of the object and to the edges of the blotter. To prevent this unwanted movement, the object will need to be kept moist by applying water or ultrasonic mist from above.

Paraprint Washing

In liquids, the rate of diffusion is influenced by temperature, viscosity of the liquid and size of the particles. In porous media, such as paper and Paraprint OL 60, the rate of diffusion is also influenced by pore size. Because the pores in (wet) Paraprint OL 60 are much larger than in (wet) blotting paper, diffusion



5 Schematic drawing of blotter washing using a screen-printing screen (side view): Polyester Film **(a);** blotting paper **(b);** sample/object **(c);** acrylic glass cover **(d);** weight **(e).**



6 Transport by diffusion during blotter washing: the situation with fresh blotting paper **(A);** the system reaching concentration equilibrium, after which the blotting paper is changed **(B).**

will be higher in Paraprint OL 60 than in blotting paper. Preliminary experiments investigated the diffusion of a red dye in a stack of wet blotting paper and of Paraprint OL 60 respectively. Diffusion was indeed much faster in Paraprint OL 60, suggesting it is more effective than blotting paper for washing. It was therefore decided to add a third washing method to the comparison: Paraprint washing. The set up of the Paraprint washing was kept the same as for blotter washing.

Hypothesis

In the capillary unit treatment the wash water is continuously refreshed, constantly removing the solutes. Because of this, washing on the capillary unit is expected to be the most effective and quickest washing method. Based on the difference in diffusion rate in blotting paper and Paraprint OL 60, it is expected that Paraprint washing will clean the samples faster and more evenly than blotter washing.

Experimental

The comparison between the washing methods aimed at making the differences between the methods clearly visible, instead of just measurable. It was decided to colour paper samples with a red dye to simulate a water-soluble discolouration and acids that washing is meant to remove. This made it possible to visualize the often barely perceptible movement of these substances through the paper. The coloured paper samples were washed using the different methods and compared visually [7]. After performing these experiments real objects were treated as case studies.

Sample Preparation

Samples of four different modern papers were cut into squares of 10 x 10 cm and marked indicating the paper and treatment method used, the machine direction and the washing session. The samples were then immersed in a solution of 50 drops of red food colouring dye Cochineal Red A, also known as Ponceau 4R (Lebensmittelfarbe flüssig E124: Städter) per liter tap water. This dye was chosen for its high water solubility and easy availability. It is acidic, which was felt appropriate as it is meant to represent acidic compounds. However, the dye might still give different results from real contaminations. The samples were left in the dye solution for approximately 36 hours to ensure homogeneous wetting. They were then taken out of the solution, 'stuck' vertically on the side of the container and left to drip for ca 30 seconds before they were hung to dry on a drying rack using a clothes pin. After drying the samples were checked for evenness of colour. Except for the slight mark from the clothes pin along one edge, the resulting colouring was very consistent throughout each paper type, indicating an even distribution of dye within the paper.

The papers were chosen to represent papers that are used for watercolour and gouache drawings, including high quality and student quality watercolour paper as well as drawing paper of medium to heavy weight. Blotting paper was included as well.

The following papers were used:

- Arches watercolour paper: 185 g/m^2, rag grain, 100 % cotton, gelatin surface sizing (Swaak Artistique);
- Da Capo No 2 Studien-Qualität watercolour paper: 165 g/m^2, cellulose (Papierfabrik Schoellershammer);
- drawing paper: 180 g/m^2, cellulose (Papierfabriek Schut);
- blotting paper: 160 g/m^2, 50 x 62 cm, 25 % cotton (Jansen-Wijsmuller & Beuns B.V.).

Preparation, Washing Duration, Drying

Washing treatments lasted 5 hours and 15 minutes [8]. All samples were humidified before washing by spraying both sides with a Dahlia sprayer filled with tap water. Samples of each paper were washed in two-fold, with machine directions running perpendicular to each other. Because of paper expansion, the samples were repositioned during the first half hour of washing to ensure good contact with the Paraprint OL 60 and screen respectively. After washing, all samples were air dried in a drying rack.

Capillary Unit Treatment

A sheet of Perspex (approximately 22.5 x 57 cm, 3 mm thick) was placed over a water reservoir, in such a way that it covered it almost completely but left a narrow gap open. A piece of wet Paraprint OL 60 measuring 60 x 48 cm, with the grain running along the length of the piece, was placed on top of the Perspex. 8 cm were hanging down into the water container, of which approximately 3.5 cm reached into the water at the beginning of the treatment. The other end was hanging 30 cm over the edge and was cut into a blunt v-shape of 145°, to make it easier for the water to collect and drip down (Tiemer 2001: 30). A second container was placed below this point to catch the contaminated water. The samples were placed on the Paraprint OL 60. The capillary unit was then covered with a second sheet of Perspex, resting on supports to maintain enough distance from the samples. This was done to prevent evaporation of too much moisture from the surface. The height difference d between the water level and the long end of the Paraprint OL 60 was 25.5 cm at the beginning of the treatment, but decreased slowly as the water reservoir drained (Fig 3).

Blotter Wash and Paraprint Wash

Blotter wash and Paraprint wash were carried out simultaneously on one screen-printing screen measuring ca 53 x 74 cm (Unknown manufacturer). A piece of thick felt larger than the screen-printing screen was laid on a table and covered with a sheet of polyester film. Two layers of blotting paper and two layers of Paraprint OL 60, both measuring 46 x 24 cm, were placed on top of the polyester film, the blotting paper to the right of the middle and the Paraprint OL 60 to the left. Both materials had been immersed in tap water and excess water had been allowed to drain off before placing them on the polyester film. Then the screen-printing screen was placed on top and the samples were positioned over the blotting paper and Paraprint OL 60. The screen-printing screen was then covered with a sheet of thick Perspex, to prevent evaporation, and the edges were weighted down, to ensure good contact between the screen and the blotting paper and Paraprint OL 60 (Fig 5).

In order to change the layers of blotting paper and Paraprint OL 60, a second table was set up in the same way as the first, so the screen-printing screen could simply be moved from one stack to the other. Changes were made every 30 minutes. The Paraprint OL 60 was reused, rinsing it between changes. The blotting paper was changed for new blotting paper (images of the actual experiment in Fig 7, 8).

Case Studies

The case studies consisted of a gouache from the first half of the twentieth century and a lithograph from 1836. The paint layer of the gouache was very sensitive to disturbance while wet, the lithograph was not water sensitive, but was an interesting object to wash as it was one of a series and the other prints were immersion washed. Fibre content of the paper was unknown, but both papers were machine-made and weighed around 150 g/m^2 (estimated). The paper of the gouache showed uneven brown staining. The lithograph had tide lines from water damage. Both objects were tested for water uptake by placing a small drop of water on the surface and observing how fast the water was absorbed. Both papers wet easily, the lithograph more so than the gouache. Before treatment the water-sensitive gouache was humidified in a humidity chamber. The lithograph was humidified using a Dahlia sprayer. Capillary unit and Paraprint washing were set up as described above.

The gouache was washed on the capillary unit, but during treatment it became clear that, contrary to the initial test results, parts of the paper would not wet, despite spraying with a mixture of water and ethanol (30:70). The gouache was left on the capillary unit until the waste water remained colourless (Fig 9). After more than 4 hours the gouache was transferred to a Paraprint wash, which lasted another 4 hours, with Paraprint OL 60 changes every 45 minutes. After treatment the gouache was air dried and rehumidified before flattening between felts.

The lithograph (shown on the left in Fig 10) was washed on the capillary unit. The paper wetted completely and very quickly. The tide lines were treated locally by blotting them with blotting paper, while still washing the whole object. After a few hours the waste water remained colourless, but the treatment was continued for a total of 7 1/2 hours. The lithograph was dried between felts directly after washing.

7 Paraprint washing (left) and blotter washing (right) the samples on one screen.

8 Changing of the soiled Paraprint OL 60 (left) and blotting paper (right). The screen is standing on its edge for the photograph, before being moved to the second table.

Results and Discussion

The results of washing can be seen in Fig 11. The first row from the left shows the untreated control samples. The second and third row show the samples treated on the capillary unit. The fourth and fifth row show the samples treated with Paraprint wash. The last two rows show the samples treated with blotter wash. All samples are shown with machine direction running vertically. The arrows indicate whether the samples were placed parallel (vertical arrow) or perpendicular (horizontal arrow) to the machine direction of the Paraprint OL 60 and the blotting paper.

In general, Paraprint washing removed the red colouring quicker and more evenly than the capillary unit treatment, especially in the case of the Arches test paper. Only the blotting paper samples gave superior results on the capillary unit instead of by

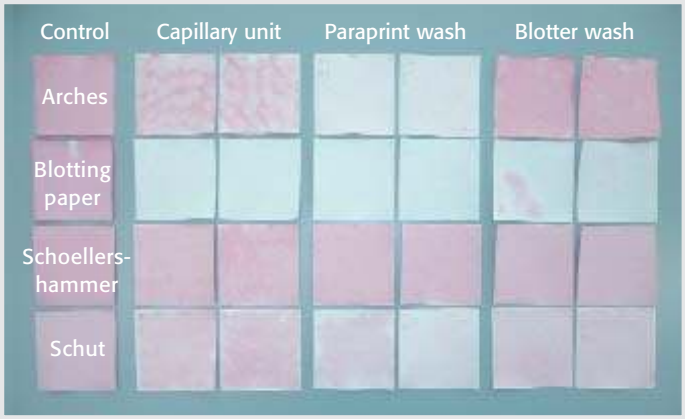
9 Washing the gouache on the capillary unit. Discolouration washed out of the object can be seen traveling through the Paraprint OL 60 and in the container below.

Paraprint washing. The red dye was removed very quickly and evenly, without any visible trace of colour. Paraprint washing did leave traces of colour in the blotting paper sample, although barely visible. Blotter washing was the least effective in washing out the red dye, but gave more even results than the capillary unit treatment.

The case studies were both considered successful. Even though the gouache did not wet completely, quite a lot of soluble discolouration was washed out (Fig 9). The successive treatment applying the capillary unit treatment first, followed by the Paraprint washing reduced the staining while keeping the paint layer intact. The stains are still visible, but are less disturbing. It would be interesting to know whether the paper would have wet better if the object had been subjected to Paraprint washing from the start, and whether this would have resulted in better removal of the stains. This is something only more experience will tell.

Interestingly, when compared to the other prints of the series that were immersion washed, the lithograph that was treated on the capillary unit was cleaner than the other prints (Fig 10). However, the paper type varied between prints so this might have been a coincidence. The better result could also be due to the longer washing duration of the capillary unit treatment, as immersion washing lasted only between 30 and 60 minutes (estimated). Another interesting aspect was the effect on the tears along the edges of the prints. The object treated on the capillary unit showed less gaping of the tears than the other prints did. But again, this could be a coincidence.

10 Verso of two prints from the same series. Left was washed on the capillary unit, right was immersion washed.



11 The washed samples after drying.

The unexpected better results for Paraprint washing in comparison with the capillary unit treatment may have several causes. Insufficient covering of the set up may have led to lower relative humidity in the capillary unit than with Paraprint washing, resulting in more evaporation from the surface and incomplete wetting of the paper. Especially the Arches paper would not lie flat without some manipulation with a brush, which seems to have left a pattern of lighter spots. Also, the suction created when pulling the layers off of the screen-printing screen during changing of the Paraprint OL 60 layers may play a bigger role than expected.

In hindsight, the test papers chosen were perhaps not the most suitable, as they do not reflect the properties of most older papers. They were extremely difficult to wet even when sprayed with a mixture of water-ethanol (30:70). The blotting paper samples and case studies suggest that the capillary unit treatment might perform better on papers that absorb water easily or are thinner.

No difference could be seen between samples that had been treated on the capillary unit with the machine direction of the paper running parallel or perpendicular to the grain of the Paraprint OL 60. Again, this could be due to the test papers used.

Paraprint OL 60 can be re-used, as shown in Paraprint washing. However, it was noticed that after drying, the fabric did not wet as quickly and showed lower rates of water flow. An explanation for this could be the formation of lime scale in the fabric due to the use of tap water. This has not been investigated. The choice for hanging length of Paraprint OL 60 for the capillary unit treatment was based on the preliminary experiments, even though the total length was different. No attempt was made to find a formula for the optimum length of the Paraprint OL 60 and height difference for the capillary unit treatment.

Conclusions

The aqueous treatment of water-sensitive, vulnerable paper objects is always a challenge to a conservator. It can be performed in various ways. This study compared three methods applicable for this specific group of objects: the capillary unit treatment, blotter washing and Paraprint washing, focusing on their effectiveness. The effect of these methods on media was not part of this study.

Based on its effectiveness and even results, Paraprint washing is recommended for aqueous treatment of most water-sensitive paper objects. Only when the object wets quite easily the capillary unit treatment is recommended, offering a time and labour saving alternative to Paraprint washing.

We suggest using the described set up for both blotter washing and Paraprint washing, using a screen-printing screen covered with Perspex. This method allows the conservator to work fast and safely and eliminates evaporation from the surface of the object, which can cause transport of solutes to the surface. If a screen-printing screen is not available, the treatment should be performed in a covered tray or container to achieve a similar effect.

Definition of the underlying principles of the aqueous treatments shows that diffusion is the main transport mechanism involved in blotter washing and Paraprint washing. In the capillary unit, transport occurs by diffusion, as well as by convection, as there is a water flow. This water flow is caused not by capillary action, but by siphoning action. This understanding rendered the slope of the capillary unit redundant, allowing for an easier set up of the capillary unit.

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Many thanks go out to the paper conservators that were willing to answer questions for the small survey about washing water-sensitive objects. Furthermore, we would like to thank Barbara Korbel at the Deutsches Historisches Museum, Berlin, for introducing the subject and for her enthusiasm in the early stages of the research. We are indebted to Jos Schrijen and Jos van Irsel for providing objects for case studies. Jule Janssen helped tremendously by providing the thesis written by Susanne Kirchner. Finally, we would like to thank Susanne Kirchner herself for openly sharing her knowledge and answering our questions regarding her research.

Endnotes

* This peer-reviewed article is based on a final thesis written in 2009 for the paper conservation training programme at the Netherlands Institute for Cultural Heritage (Instituut Collectie Nederland, ICN) in Amsterdam, the Netherlands. It was presented on May 28th 2010 at the IADA Symposium 'Out of Sight—Out of Mind?' in Prague. In 2010 the thesis was expanded and submitted as final thesis for the Master's degree in Conservation and Restoration of Cultural Heritage at the University of Amsterdam.

[1] This statement is based on a small survey held among paper conservators in the Netherlands in 2009.

[2] Paraprint OL 60 has much better diffusion properties than blotting paper and for that reason has also been applied to float screen washing, with great success (Huhsmann and Hähner 2007). Other applications of Paraprint OL 60 in conservation have not yet been published.

[3] In theory the siphoning action stops when the hydrostatic head equals the atmospheric pressure (approximately a 10 m water column), but in our experiments the length d was only varied up to 29 cm maximum.

[4] Although the slope of the capillary unit is not necessary for its functioning, it does not significantly hinder it either. Conservators can choose how they build a capillary unit, with or without slope, and adjust the described variables to increase or decrease water flow as they see fit.

[5] This is a simplified explanation. The fact that stains were observed to move through the test samples in the flow direction means that either there is also diffusion of the solute molecules back into the object or there is also transport by convection (flow) within the object.

[6] Bas van Velzen experienced this difference in earlier, unrelated experiments.

[7] Originally the comparison would also involve spectrophotometry, but this was rejected because of the clear differences between the washing results, and because the samples washed unevenly, making colour measurement meaningless.

[8] Washing was also carried out for a longer period of time and using a water-ethanol mixture for humidification, but for the sake of clarity this article only discusses the shorter treatment. However, the longer treatments yielded similar results when comparing the different washing methods.

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Suppliers

Swaak Artistique, Oudegracht 195-197, 3511 NG Utrecht, The Netherlands, Tel +31-30-2311565, Fax +31-30-2328811, www.swaakartistique.nl (Arches watercolour paper: 185 g/m^2, rag grain, 100 % cotton, gelatin surface sizing, ca 57 x 76 cm).

Jansen-Wijsmuller & Beuns B.V., Postbus 166, 1530 AD Wormer, The Netherlands, Tel +31-75-6211001, www.jwb-ceka.nl (blotting paper: 160 g/m^2, 50 x 62 cm, 25 % cotton).

Fischer Scientific, Zuideinde 70, 1121 CM Landsmeer, The Netherlands, Tel +31-20-4877000, www.emergo.nl (Ethanol 95 % v/v, laboratory reagent grade).

GMW Gabi Kleindorfer, Aster Str. 9, 84186 Vilsheim, Germany, Tel +49-8706-1094, www.gmw-gabikleindorfer.de/shop (Para-print OL 60 non-woven viscose fabric: 1 x 100 m roll, 60 g/m^2; polyester film).

Unknown manufacturer (one screen-printing screen measuring ca 53 x 74 cm).

Papierfabrik Schoellershammer, Heinrich August Schoeller Söhne GmbH & Co. KG, Kreuzauer Str. 18, 52355 Düren, Germany, Tel +49-2421-557-0, Fax +49-2421-557-110, www.schoellerhammer.de (Da Capo No 2 Studien-Qualität watercolour paper: 165 g/m^2, cellulose, block of 20 sheets, 24 x 32 cm).

Papierfabriek Schut b.v., Kabeljauw 2, 6866 NE Heelsum, The Netherlands, Tel +31-317-319110, Fax +31-317-312754, www.papierfabriekschut.com (drawing paper: 180 g/m^2, cellulose).

Städter GmbH, Am Kreuzweg 1, 35469 Allendorf/Lumda, Germany, Tel +49-6407-4034-1000, Fax +49-6407-4034-1009, www.staedter.de (Lebensmittelfarbe flüssig: Ponceau E124 Cochineal Red A, Art. Nr. 392304).

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Local Strenghtening of Mould-Damaged Manuscripts

A Case Study on Logbooks of Early French Expeditions in Louisiana (1684-1722)*

The National Archives in Paris house the logbooks of early French expeditions in Louisiana, preserved in their original binding. They raise current conservation issues specific to archival materials: iron gall inks are relatively well preserved but the paper is extremely weak on the edges, as a result of old water damages and micro-organisms growth. Using local consolidation techniques to strengthen the paper of these documents would prevent us from removing the bindings, hence allowing for minimal interference. But these methods generate a substantial number of risks: formation of tide lines more likely to turn brown over time, local distortion of the paper, and iron gall ink migration. Often underestimated, the latter aspect should prevail in the decision-making process. Indeed, the formation of halos around and on the verso of the ink lines is often barely noticeable to the naked eye, but always comes with a migration of iron-ions, which is particularly detrimental to the manuscripts. We therefore sought the parameters of a local re-sizing technique that would limit, as much as possible, tide lines, distortions and ink migrations. We finally opted for a 2 % Klucel G® in ethanol as adhesive and re-sizing agent. The solution was applied directly with a brush on damaged areas, in a local procedure combining re-sizing, lining with Berlin tissue, and infilling. This study provides an alternative to existing treatments that usually employ water based adhesives. It allows a satisfactory local consolidation and preserves the original feature of the ink, the paper, and the binding.

Lokale Verstärkung schimmelgeschädigter Manuskripte: ein Fallbeispiel von Logbüchern früher französischer Expeditionen nach Louisiana (1684–1722)

Das Nationalarchiv in Paris beherbergt die original gebundenen Logbücher früher französischer Expeditionen nach Louisiana. Während die Eisengallustinten relativ gut erhalten sind, ist das Papier an den Kanten durch alte Wasserschäden und Mikroorganismen-Befall extrem geschädigt. Eine lokale Konsolidierung würde den Erhalt der originalen Bindung erlauben, birgt jedoch auch Risiken: das Entstehen von Wasserrändern, die sich im Laufe der Zeit verfärben, lokale Verformung des Papieres, Migration von Eisengallustinten. Oft unterschätzt, könnte Letztere den Entscheidungsprozeß entscheidend beeinflussen. Die Bildung verfärbter Bereiche neben und unter den Tintenbereichen ist für das bloße Auge meist kaum sichtbar, jedoch führt diese immer zu einer Migration von Eisenionen, welche besonders schädlich für Manuskripte ist. Die lokale Nachleimung sollte die Bildung von Wasserrändern, Verformungen oder Tintenmigration verhindern. Zum Nachleimen wurde daher Klucel G® in Ethanol (2 %) gewählt, welches direkt mit einem Pinsel auf die geschädigten Bereiche aufgetragen wurde. Diese Methode kombiniert Nachleimung, Kaschieren mit Berlin Tissue und Fehlstellenergänzung und bietet eine Alternative zu exisiterenden Behandlungen, die normalerweise wasserhaltige Klebstoffe verwenden. Es erlaubt eine erfolgreiche lokale Konsolidierung und bewahrt die originalen Merkmale der Tinte, des Papieres und der Bindung.

The National Archives in Paris houses one of the most precious collections of French expedition logbooks. Inherited from the 'Service hydrographique', previously 'Dépôt des Cartes Plans et Journaux de la Marine', the so called '4JJ'-series consists of 477 documents mainly identified as everyday logbooks, exploration reports and their abstracts. These abstracts were prepared between 1736 and 1742 by the 'Dépôt des Cartes Plans et Journaux de la Marine' whose mission was, among others, to collect logbooks in order to produce nautical maps. The Conservation Centre of the National Archives is currently working on this collection as part of a larger project [1].

This article reports a one year graduation project focused on the conservation of the box 4JJ14, containing the documents of the very early voyages trips to Louisiana (1684-1722). These documents, sixteen logbooks, were chosen because their condition was deemed quite representative of the whole collection (4JJ).

Condition of the Documents

The manuscripts, written with iron gall ink [2], are bound with more or less developed book binding structures, made before or shortly after the journey. As the bindings are contemporaneous with the expeditions, they convey information about the practices in use at that time by the writers, the bookbinders and the persons in charge of collecting this type of record. The structures are also specific to the logbooks (Fig 1): simple quires covered with white or marbled papers and stationary vellum bindings, generally stiff board with laced-in sewing supports. This 'original state', combined with its specificity, led us to consider minimal intervention preserving all aspects of the physical object as well as the text for the information they provide on the document's history and use.

1 The 16 logbooks of early French expeditions in Louisiana (Service hydrographique, Marine 4JJ14, National Archives). © G. Vanneste/INP.

The text block condition was problematic, raising current issues specific to archival materials. First, the inks are in different conditions: in some cases, they became very pale in the course of writing, as if the author was running out of ink and diluted it during the expedition (Fig 2a). In other cases, the leaves show evidence of damage from moisture, which has generated a significant migration of ink through the paper (Fig 2b). Furthermore, a characteristic deterioration of the paper by the ink is sometimes visible, causing few tears and small losses. These remain fortunately very local (Fig 2c). However, the writing is generally fairly well preserved and the text remains easily legible.

The major problem emerging from these documents does not come from the ink as much as the paper itself. Some of the logbooks have suffered from significant water damage on the edges combined with rodents and micro-organisms attacks (Fig 3). The paper has lost its strength and has become soft and spongy with areas of loss, fragmentation, and thinning clearly visible. This weakening is localized but often repeated on every sheet, preventing from proper handling and threatening the physical integrity of the documents.

Background

A Local Approach: Relevance of Partial Re-Sizing

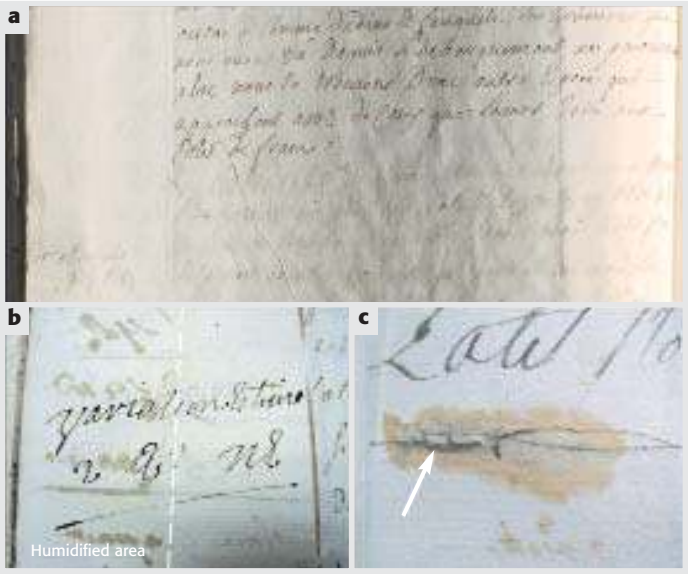
One concern was to avoid the removal of the bindings in order to respect the historical value of the documents. A local approach was therefore adopted, since the degradation of the paper was localized along the edges. Local strengthening techniques that would consolidate the deteriorated areas only were investigated. This approach presents the added advantage of preserving the original properties of undamaged areas, especially those containing iron gall inks in good condition. Two consolidation techniques were then considered: partial re-sizing and localized lining.

In the paper industry, sizing aims to make the paper less permeable to water. In conservation practice, the rationale is different. The main purpose is to enhance the mechanical properties of the paper. It is generally applied on papers that were weakened by micro-organisms, or that supported immersion treatments, like washing, bleaching or deacidification (Baker 1992; Henry 1986; Seki et al 2005, 2009; Strnadová and Durovic 1994). It then aims to impart strength, improve the 'feel' of the sheet and reintroduce characteristics lost through degradative influences or conservation treatments (Henry 1986).

Overall re-sizing treatments are often mentioned in the literature, but localized interventions are rarely studied because they are hardly practiced. This reluctance of conservators is partly due to the risks that are inherent to local interventions. The application of an adhesive, often aqueous, on a portion of dry paper can cause distortion, discolouration, and tide lines at the wet/dry interface. Partial re-sizing has been first explored (Ribbans 2006) to compare the effect of methylcellulose and gelatine on the appearance, brightness, and pH of modern laboratory paper (Whatman no1) previously boiled in order to reproduce degradation. Yet, it appeared necessary to further this work by studying other adhesives and papers and assessing, among others, the risk of halos formation.

Risks Related to the Presence of Iron Gall Inks

Aqueous treatments are likely to cause a migration of brown products coming from the ink and/or from the paper. A previous work was undertaken on this subject (Rouchon et al 2009), and showed that most of the brown halos formed around the ink lines are hardly visible in a context of conservation practice. However, these colourations come with a significant migration of iron in the paper, known to be detrimental to its proper conservation.



2 Ink deterioration (the Durance logbook, no 13: **(a)** fading of the ink (dilution issue); **(b)** ink migration through the paper (humidity/water); **(c)** ink corrosion on paper (oxidative and hydrolytic degradation of cellulose). © G. Vanneste/INP.

3 Paper degradations (the Durance logbook, no 13): **(a)** Water stains and tide lines along the edges (UV light); **(b)** Micro-organism damages (upper corner of the text block). © G. Vanneste/INP.

Tab 1 Adhesives selected.

Name	*Product name*	*Composition*	*Supplier*	*Manufacturer*	*Solution*	*Brookfield viscosity (mPa.s)**
zin shofu	Zin Shofu®	Wheat starch	Atlantis (Fr)	Paper Nao (Japan)	Distilled water	–
gelatine	Gelatine B 225	Type B bovine gelatine with medium bloom degree (225) (reference: 225LH30)	Rousselot (Vion Cy, The Netherlands)	Rousselot (Vion Cy, The Netherlands)	Distilled water	–
methocel	Methocel® A4C	Methylcellulose	Dow Chemicals (USA)	Dow Chemicals (USA)	Distilled water	350-550
tylose	Tylose MH300P®	Methylhydroxyethyl-cellulose	Stouls (Fr)	Shin Etsu (Japan)	Distilled water	180-300
klucel	Klucel G®	Hydroxypropylcellulose	Stouls (Fr)	Hercules (USA)	Ethanol (> 99 %)	125-450

* Brookfield viscosity is measured at 20 °C for 2 % solutions prepared in water (fabricant information).

Paradoxically, humidification treatments considered to be the less invasive ones, such as those using Gore-Tex®, are precisely causing the most obvious migrations: when soluble compounds are not extracted in the solvent, they migrate into the paper (Reissland 2001: 111). To prevent such migrations, there are two recommended approaches. One is to keep the documents at a relative humidity below 80 %. The other is to immerse the documents in water in order to wash out most of the soluble detrimental products. In this case, water must not be mixed with alcohol and the immersion should last for a sufficient amount of time (about 30 minutes). However, this method can appear drastic, since the manuscript composition undergoes significant chemical changes during this type of treatment. Moreover, both, the paper and the ink, especially when the latter has already faded, can become lighter, thus making the text less legible.

Only simple aqueous treatments were investigated in order to ensure a satisfactory reproducibility of the experiments. These treatments do not fully represent more sophisticated techniques usually used in a conservation workshop. In particular, different methods of re-sizing, using various adhesives at different concentrations, were not investigated. Gelatine is often recommended and sometimes used to treat iron gall ink manuscripts (Kolbe 2004; Smith 2007). This adhesive, as a re-sizing agent, presents the advantage of making paper less permeable to water (Duplat et al 2008). Therefore, it provides a better protection in high humidity and is generally recommended for re-sizing paper after immersion treatments. In these cases, if the immersion time is long enough, the soluble compounds are extracted, thus limiting the risks of migration. On the contrary, choosing a local approach on untreated documents involves risks of ink migration. Those risks prevail over other criteria when selecting an adhesive and thus must be estimated in conditions as close as possible to those of a workshop.

Research Purpose

The aim of this study is to evaluate the possibility to use partial re-sizing techniques on iron gall ink manuscripts that suffered from mould damage on the edges and were never treated before. Two directions were investigated. The first deals with the choice of a local re-sizing technique and its side effects on paper. The second deals with the risk of ink migration compared with other re-sizing procedures that are currently in use in conservation centres.

Choosing a Local Re-Sizing Technique Suitable for Paper

Adhesives and Procedures

Five widely used adhesives were selected for this study: Tylose MH300P®, Methocel® A4C [3], Gelatine B225, Klucel G® (soluble in ethanol) and Wheat starch paste (Zin Shofu®). Their specifications are summarized in Tab 1. Among the various methods of re-sizing, the most commonly cited by conservators are immersion and brush application (Henry 1986). Immersion is not suitable for local application, because it increases the risk of tide-line formation. Thus, preliminary tests were conducted in order to select an application technique that would, a priori, be appropriate for mould damaged paper containing iron gall ink, in the context of a conservation studio.

Several methods were tested: reactivation of a dry gelatine film placed on the paper surface, spray of a gelatine solution, and application with a brush directly on the paper or through a non-woven polyester fabric. Finally, a direct application with a brush proved to be the most suitable in terms of ease, handling and aesthetic results [4].

Which Concentration Strengthens the Paper?

The ability of adhesives to strengthen papers that are mechanically damaged by micro-organisms was evaluated empirically on original documents. The samples come from blank leaves, deteriorated by mould through all their thickness. The five adhesives (Tab 1) were prepared at concentrations ranging from 1 to 5 % and applied on the weakened areas, using the brushing method described above [4].

After drying, the samples were manipulated by three paper conservators to evaluate how re-sizing improved the strength of damaged areas. A consensus was quickly reached regarding the concentration at which each adhesive sufficiently strengthens the paper without stiffening it: 1 % for *gelatine,* 3 % for *klucel,* and 2 % for *zin shofu, tylose* and *methocel*.

Risks of Tide-Line Formation and Paper Distortion

The re-sizing treatment, when applied locally, is likely to induce paper distortion, tide-lines and a change in paper surface appearance. These side effects, although minor compared to those related to ink migration, were evaluated in the first instance on an old mould damaged paper, submitted to artificial ageing [5]. All adhesives were applied with the concentrations selected above. These preliminary tests gave very encouraging results: no colour change between blank and treated areas was visible (Fig 4); no tide lines could be observed under UV or visible light (Fig 4); no change in surface appearance (gloss, texture of the paper) could be noticed (not shown). However, water-based adhesives tended to cause dimensional changes, which were limited when the paper was dried under weights.

These effects were further evaluated on another original paper and on a laboratory paper (Whatman no 1). The latter appeared relevant to us despite the fact that its chemical composition consistently differs from that of an 18th century handmade paper. In fact, its colour is close to white, making subtle colour changes more likely to be detected. Whatman paper is also extremely hydrophilic and warps easily. Finally the formation of tide lines can be recreated on this paper (Dupont 1996).

One millilitre of each adhesive was dropped off with a pipette on the two types of paper. Samples were then dried stretched, with their edges clipped between two cardboard frames. The sandwiched samples were held horizontally raised from the table surface during the air drying process to avoid any contact. Some of them were artificially aged for three months [5]. The pictures taken with grazing light (Fig 5) confirm that all aqueous treatments created distortions. Only *klucel* in a 2 % ethanol (> 99.5 %) solution does not cause dimensional changes. Tide lines and discolourations of the paper are generally better visible under ultraviolet light, although the reasons of their formation are not fully understood yet (Dupont 1996). These fluorescent compounds are known to disappear during the natural ageing of paper, replaced by visible yellow brown discolouration specific to water stains. Tide lines are observed on every sample, including on the un-aged Whatman paper only submitted to a drop of pure water (Fig 5). These tide lines are more pronounced on the original paper, probably because size and degradation products are dissolved in the drop and get more concentrated along the migration front, as watercolour pigments would do.

Among all adhesives, *klucel* generates the least-noticeable halos on both original and laboratory papers (Fig 5), under daylight and UV light. *Zin shofu* also presents satisfactory results, because it seems to cause halos quite similar to those of pure water. *Gelatine* remains hardly visible under daylight, but fluoresces significantly on Whatman paper after ageing. Finally, *methocel* and *tylose* cause both the most obvious changes on both papers, with fluorescent tide lines under UV light, and a yellow-brown halo appearing under visible light.

4 Partial re-sizing (brush method) of old damaged paper through artificial ageing tests. Only the right part of the samples (with mould) has been re-sized. No tide lines or colour changes are visible before and after ageing.

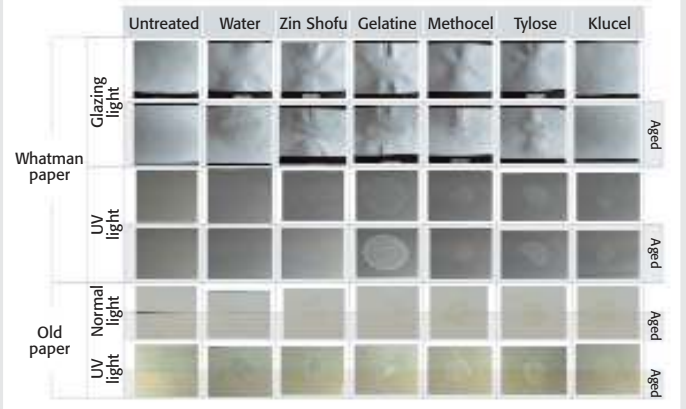
In Search for a Re-Sizing Procedure Suitable for Iron Gall Inks

The main objective of this work is to assess the risk of ink migration resulting from re-sizing treatments. It was elaborated within a larger project undertaken at the CRCC (Centre de Recherche sur la Conservation des Collections) and in collaboration with the French National Library. Four types of re-sizing application were investigated: immersion was first considered as a reference method because it is the most reproducible. Then three different types of brush application were selected (Tab 2). The first (brush 1) corresponds to the application method, described above [4]. The two others (brush 2 and brush 3) are adapted from a cleaning/strengthening procedure that is used to remove soluble products by mopping up the wet document with blotting paper.

Fifty original iron gall ink manuscripts were chosen specifically for this study. They have various origins and no initial value. On each manuscript, small pieces were sampled then re-sized using the different methods listed in Tab 2. The methodology, described extensively elsewhere (Rouchon et al 2009) consists of a comparison of macro photographs taken on original samples before and after treatment in order to identify visible migrations.

Visual Observation Using Macro Photographs

Macro photographs were taken of the recto and verso of each sample under similar lighting conditions provided by an illuminating box built with daylights. The pictures were then compared to assess visual changes: 'Lateral migrations' refer to halos which are formed on the recto of the document, around the writing lines, while 'transverse migrations' describe the



5 Partial re-sizing (drop method) of new and old papers through artificial ageing tests.

Tab 2 Adhesives selected. Klucel was prepared in > 99 % ethanol. The other adhesives were prepared in distilled water. All adhesives were used at room temperature, between 20 and 22 °C. 'Direct application with a brush' means that the brush is applied three times (left to right, then top to bottom, then bottom to top) on the recto and the verso of the sample.

Method	*Description*	*Solution/adhesive*
immersion	Immersion for 5 minutes. The excess of adhesive is removed by placing the edge of the sample perpendicular to a blotting paper. Air drying on a non-woven polyester film.	distilled water *zin shofu* (2 %) *gelatine* (1 %) *methocel* (2 %) *tylose* (0,5 %) *tylose* (2 %) *klucel* (3 %)
brush 1	Direct application with a brush. No removal of the excess of adhesive. Drying between wool felts, non-woven fabrics and under woodenboards and weights (pressure 20 $g.cm^{-2}$).	distilled water *zin shofu* (2 %) *gelatine* (1 %) *methocel* (2 %) *tylose* (2 %) *klucel* (3 %)
brush 2	Direct application with a brush. Immediately after, the excess of adhesive is removed manually by pressing the sample with the thumb between two blotting papers. Drying in a press with interleaving wool felts.	*tylose* (0.5 %)
brush 3	Direct application with a brush. Immediately after, the excess of adhesive is removed by pressing the sample for 2 seconds between two blotting papers with a pressure of approximately 0.4 $kg.cm^{-2}$. Drying in an unclamped press with interleaving wool felts.	*tylose* (0.5 %) *tylose* (2 %)

coloured compounds, which migrated through the paper, onto the verso of the sample. Two migration levels are then identified (Fig 6): 'subtle' migrations which cannot be identified in a conservation practice context where a large number of documents has to be treated at the same time, and 'obvious' migrations which can easily be observed by naked eye.

The visual examination was made by three professionals separately to obtain consistent results. After homogenization of all the observations, the results were summarized in two histograms representing the number of subtle and obvious migrations for each treatment (Fig 7).

Results

Whatever the method of application, all aqueous adhesives cause ink migration. The great majority of the migrations are subtle, which means hardly noticeable during regular conservation practice. However, they are no less detrimental. As previously observed (Rouchon et al 2009), the inks are more likely to migrate through the paper than around the writing lines. This observation is probably related to the fact that inked areas are generally more hydrophilic than blank ones.

Considering aqueous sizing, the number of migrations differs somehow from one method to another. However, none of the aqueous treatments appears suitable, as they all cause transverse migrations on at least half of the samples.

The water uptake was estimated by weighting paper samples before and after the sizing application. No correlation was found between this water uptake and the observed migrations: the samples treated with brush 2 and brush 3 methods gain about 25 times their weight in water. However, Fig 7 shows that lateral migrations were more numerous on these samples than on those treated with the brush 1 method in which samples absorbed 50 times their weight in water. In all treatments, the water uptake during the re-sizing process is probably largely above the minimum that would cause migration of soluble compounds.

Finally, no migration was observed on the samples treated with *klucel* in ethanol (> 99 %). This result corroborates previous tests which showed that no visible components of iron gall inks dissolve in ethanol. The addition of 3 % hydroxypropylcellulose does not change this property [6].

Conservation Treatments: A Local Consolidation Procedure Combining Re-Sizing, Infilling, and Lining

The Choice of an Adhesive

The work described above shows that it was not possible to find an aqueous technique of partial re-sizing that minimizes the risk of ink migration. From this point of view, the *klucel* prepared in ethanol offers the most reliable alternative. It does not induce any visible migration of iron gall inks, it significantly strengthens the damaged paper without creating distortion, and it involves less visual side effects (tide lines, discolouration, etc.) than other tested adhesives. Therefore, we chose to consolidate the text block of the logbook 4JJ14 using *klucel* not only as a sizing agent but also as an adhesive.

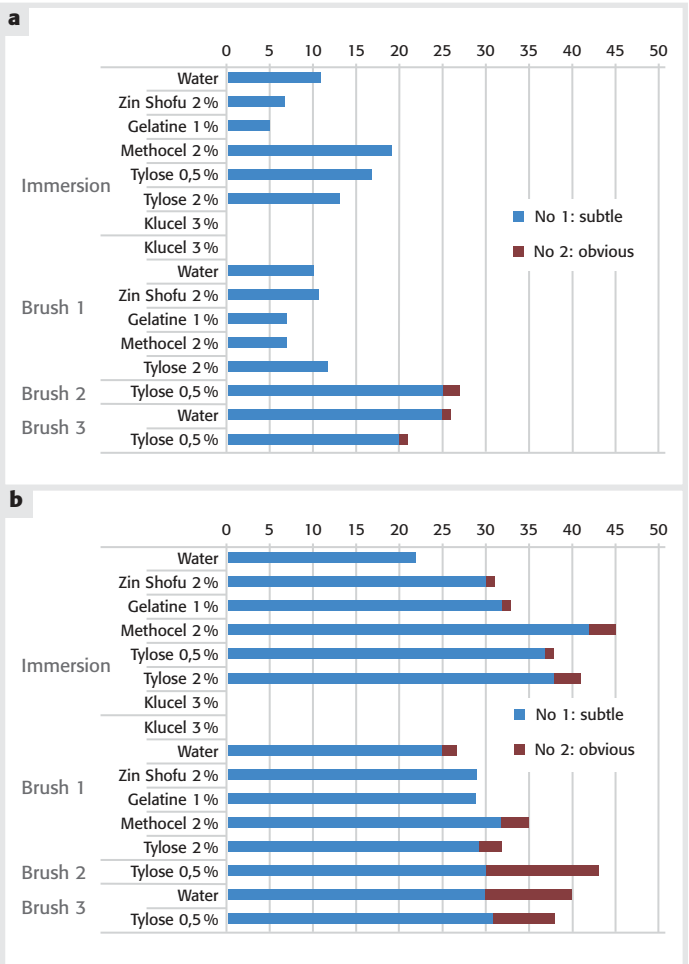
6 Samples with subtle and obvious ink migrations after re-sizing.

From Re-Sizing to Lining

The weakened fluffy areas of the paper were first cleaned with a micro-vacuum [7], and then re-sized with *klucel* prepared at 3 % w/v in ethanol (> 99.5 %). These areas were mainly located along the centre folds and the edges of the text block. On the most damaged areas, and especially on the upper corners (Fig 3), the re-sizing treatment did not sufficiently strengthen the paper. A consolidation procedure was hence developed combining re-sizing, infilling, and lining of damaged areas. This should be easy to carry out in a relatively short time for a large-scale application, in particular with the other logbooks of the collection.

Selecting a Lining Material

Prior to treatment, some tests were carried out to select a lining material. Three papers were compared: two Japanese machine-made papers, RK1 (kozo, 8 $g.m^{-2}$) and RK00 (kozo, 3.6 $g.m^{-2}$), and a handmade paper, the Berlin tissue® (mixture of kozo and mitsumata fibres, 2 $g.m^{-2}$: Gangolf Ulbricht). This latter is already mentioned in several articles about the consolidation of manuscripts with iron gall ink deterioration (Pataki 2009, Titus et al 2009). The tests led us to choose the two thinnest materials (RK00 and Berlin tissue®) since they impart sufficient mechanical strength to the paper without affecting the legibility of the writing. However, although the RK00 performance is satisfactory, the Berlin tissue®, nearly invisible, provides much better aesthetic results with a great ease of application. Indeed, RK00 has to be water torn and slightly pre-toned with watercolours to be less visible, which involves a more time-consuming procedure. The Berlin tissue® can, on the contrary, be cut with a scalpel and used as such, which actually reduces the treatment time and largely compensates its high purchase cost.



7 Number of documents on which ink migrations were observed after treatment: **(a)** lateral migrations and **(b)** transverse migrations.

Choosing a Local Lining Method

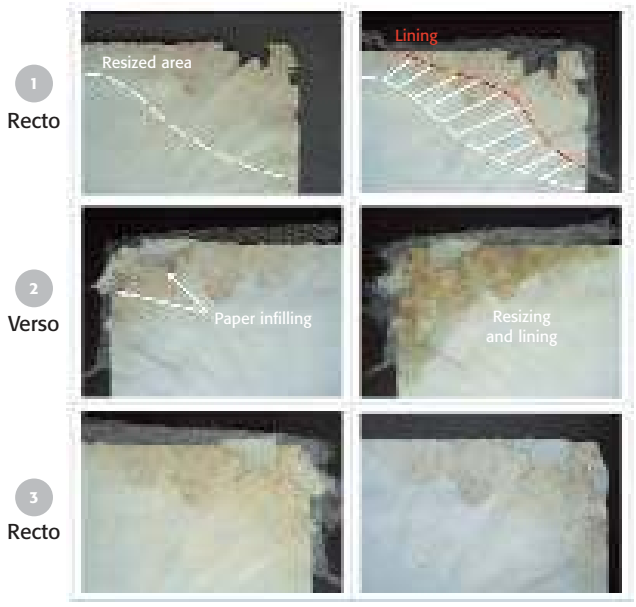
Several lining techniques were compared on old mould damaged papers. The tested methods were: brushing the adhesive directly through the lining paper, adhesives pasted out over an absorbent surface (blotter) prior to lining, and reactivation of pre-coated papers. The latter technique, often used with gelatine when iron gall ink is concerned, is also mentioned because it allows a good control of the gesture (Pataki 2009, Duplat et al 2009, Anderson and Reidell 2009). At the end, the brushing-through method proved to be the easiest, and fastest option with the best aesthetic results in comparison with the other methods.

Consolidation Procedure for the Upper Corner

Every step of this procedure was carried out using a synthetic hair brush and 2 % w/v *klucel* diluted in 99.5 % ethanol. This concentration is lower than the one used in the tests, because re-sizing is here followed by lining. It involves the application of a second layer of adhesive and we wanted to prevent the treated area from being stiffened by it.

The procedure is organized in three steps (Fig 8):

> The damaged area is re-sized. Then a piece of Berlin tissue® or RK00 is pasted using a very soft synthetic brush with nylon filaments (Fig 9). The viscosity of the *klucel* solution and its dilution in ethanol allow a good application without damaging the fibre structure of the thin paper. The lining does not cover all the



8 Local consolidation procedure combining re-sizing, infilling and lining.

re-sized part, but it slightly exceeds the outer edges of the document.

> The page is turned and partially re-sized. Losses are then in-filled with pretoned Japanese paper (~ 30 $g.m^{-2}$, with water-colours), using the lining paper on the recto to support the in-fill. The area is finally lined, thus immobilizing the in-fill paper in a sandwich of thin lining papers.

> After drying, the excess paper is cut with a scalpel along the outer edges of the document.

Upon reflection, and for ethical and mechanical reasons, it was decided not to reconstruct the missing corner of the sheets up to the original format. We only filled the losses up to the outer edges of the paper. On the one hand, a complete filling of a corner would go far beyond the theoretical aim of this intervention, namely mechanical stabilization of the sheets. On the other hand, pasting a large piece of new material on an old mouldy paper increases the risk of fold formation along the graft area.

Conclusion

The consolidation procedure proposed in this study provides a satisfactory solution to the specific problem of manuscripts that present well-preserved iron gall inks on mould damaged paper. This technique preserves all the original structural parts of the binding and the initial composition of both papers and inks in the undamaged areas (Fig 10).

The use of extremely thin but strong enough papers (Berlin tissue® or RK00) provides a lining that significantly reduces the prevalent problems concerning the opacification of the writing lines. Furthermore, the use of 2 % w/v Klucel G® in ethanol, both as re-sizing and lining agent, highly limits the risk of visible ink migration, of paper distortion and tide-lines formation.

Re-sizing prepares the paper prior to lining. Far from being dispensable, this step presents the additional benefit of increasing the adherence of the lining paper onto the damaged area. The Klucel G® that was impregnated in the damaged areas is probably reactivated during the lining process. Finally, considering the application itself, the direct brushing technique appears to be fast, convenient and also easy to implement on a large scale collection within reasonable treatment times. Close to half an hour per page, this procedure can be widely adapted and used for the treatment of archival collections with similar issues.

9 Lining with Berlin tissue, the brushing-through method. © G. Vanneste/INP.

10 The Durance logbook (no 13), before (on the left) and after treatment (on the right).

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Endnotes

* A French version of this peer-reviewed article was published in 'Support Tracé', no 10 (2010): Martin, A., et al.: 'La consolidation locale de manuscrits altérés par des microorganismes: Le cas des journaux de bord des premières expéditions françaises en Louisiane'.

[1] The National Archives have recently decided to collect within the Marine 4JJ series every logbook produced in the context of slave trade expeditions conducted by the French East India Company between 1721 and 1757. The project involves the production of a digital edition of these documents in order to promote French archives related to slavery and increase the circulation of information on this subject. Prior to digitization, one-fourth of the documents underwent conservation treatments and the totality was re-housed.

[2] The presence of iron(II) ions was identified on the sixteen manuscripts with the bathophenanthroline indicator paper test, pointing to iron gall inks applied as writing fluid.

[3] Although hardly used in France, the Methocel® A4C was chosen because it is often mentioned in the literature as a methylcellulose (Evetts et al 1989; Ravines et al 1989; Baker 1992; Biggs 1997). We found it interesting to compare this adhesive with the Tylose MH 300P®, widely used in France, and frequently presented as a methylcellulose although it is, from a chemical standpoint, methylhydroxyethycellulose. The only reference found on this adhesive (Strnadova and Durovic 1994) compares its performance to another methylcellulose (Glutofix 100®).

[4] The sample is re-sized on both the recto and the verso, brushing first horizontally and then vertically in order to create a smooth intermediate area with no clear demarcation between treated and untreated paper. The sample is then dried under weights between wool felts and non-woven polyester fabrics (Reemay, 17 $g.m^{-2}$) with a soft pressure of approximately 20 $g.cm^{-2}$.

[5] The conditions of artificial ageing are based on the standard of sealed tubes ageing (ASTM D 6819-02). All samples were pre-conditioned at 80 % RH prior to ageing. Each tube (210 mL) contains 4 g of paper. It is then hermetically closed and aged for three months at 50 °C. This specific temperature was chosen to avoid the gelatine denaturation that takes place beyond 60 °C. The relative humidity measured in the tubes remained close to 70 % during ageing.

[6] *Klucel* must be prepared in pure ethanol (> 99.5 %) and not in technical grade ethanol (95 %) as sometimes used in conservation studios. Indeed, the 5 % residual water may cause ink migration, as observed during previous tests.

[7] Micro-organisms, no longer active, have left small coloured deposits on the paper surface, probably with residual spores. To prevent a possible risk of recontamination, each page has been dry cleaned with a micro-vacuum HEPA filter (High Efficiency Particulate Air). A protective framework with textile muslin was placed on the documents to immobilize the paper fragments during aspiration.

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Suppliers

Atlantis France, 35, rue du Ballon, 93160 Noisy-le-grand, France, Tel +1-48-15-51-51, Fax +1-48-15-51-50, www.atlantis-france.com (Bathophenanthroline paper test, Japanese paper Nao RK00, RK1, *Zin Shofu*).

The Dow Chemical Company, 2030 Dow Center, Midland, MI Michigan 48674, U.S.A., Tel. +1-989-636-1463, Fax +1-989-636-1830, www.dow.com (Methocel® A4C)

Gangolf Ulbricht, Mariannenplatz 2, 10997 Berlin Germany, Tel/Fax +49-30-6158155, www.gangolfulbrichtpapier.com (Berlin Tissue®).

Rousselot, Vion Company, Kanaaldijk Noord 20-21, 5691 NM SON, The Netherlands, Tel +31-499-364100, Fax +31-499-373873, www.rousselot.com (Gelatine B 225 LH 30).

Stouls, 9/11 Rue de l'orme Saint Germain, 91165, Champlan cedex, France, Tel +33-1-69101070, Fax +33-1-69101079, www.stouls.com (Klucel G®, Tylose MH300P®; non woven polyester Reemay 17 $g.m^{-2}$).

Whatman Inc, 200 Park Avenue, Suite 210, Florham Park, NJ 07932, USA, Tel +1-973-245-8300, Fax +1-973-245-8324, www.whatman.com (Paper filter no1)

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Véronique Rouchon has an engineering background (Ecole Polytechnique, Palaiseau) and a PhD in material sciences (University of Paris VII). She was appointed lecturer at the University of La Rochelle and joined the Centre de Recherche sur la Conservation des Collections in 2006 in order to focus her work on paper conservation science.

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Electroluminescence Panels—Light Sheets

Electroluminescence Panels (EL Panels) are lighting sheets that are used in the retail industry to illuminate advertising boards. They can be fully or partially illuminated and are available as sheets (A5 tot A1 size), strips and various shapes in different colours. Large formats are a bit thicker and called EL Panels. EL Sheets are very thin, less than one mm, flexible, light-weight and energy efficient. According to the supplier, they consume 75-90 % less energy than standard forms of lighting. EL sheets operate on 12 V power and you can use the same adapter for most of the sizes or order a separate one for each EL Sheet (Fig 1).

Use in Conservation

The EL Sheets can be used as portable light sheets for the examination of works of art on paper. The fact that they are very thin makes it easy for them to be placed between sheets of paper (Fig 2) in order to examine watermarks, different paper characteristics such as laid and chain lines, previous repairs, thinner areas of the support etc. They can also be used in exhibitions for the display of works of art such as glass plate negatives, paper negatives or slides, since they are easy to use without altering the appearance of the display. The EL Sheets emit no heat and when measured with the light meter they showed readings of between 226-240 lux for an A4 size sheet and 260-330 lux for A3 size sheet. No UV was detected. The life span, according to the manufacturer is about 15,000 hours.

Another use of the EL Sheets is in conservation treatment as luminescent supports during application of local repairs and infills. EL Sheets can be easily wiped clean after use of water- soluble materials but the surface is not tested yet for use with any solvents.

Advantages and Disadvantages

EL sheets are easy to cut to the desired size for each purpose. They are affordable with prices depending on the size of the sheet and the adapter used. They are waterproof and fireproof, thin and easy to carry for in situ work.

One drawback is the colour of the light, which tends to have a bluish or pinkish tint. It is important when you order to specify the use of the products and request for as neutral colour as possible. When compared to other products offered by suppliers of conservation materials, the intensity of the light is inferior and that should be weighed against their affordability and thinness depending on the desired use.

The company can provide EL sheets to the customers' specifications. The conservation field is a new target area for them and they are keen to explore it and adjust their products to meet our needs. For example, initially the sheets had the connection at the back of the sheets but after discussions with conservators, the manufacturer moved it to the side so it will not cause any damage when inserted between two sheets of paper, for example in a book or an album. At the moment, the company is developing a light sheet with dimmer instead of the on/off switch that is used currently. Hopefully, that may improve the light intensity of the next generation of EL sheets. Another point to make is the high pitch tone that some sheets produce when switched on. So don't be surprised or worried that your product is defect. Altogether, Electroluminescence Sheets are thin, light and easy to carry. This makes them an applicable tool for exhibition, in situ examination and conservation treatment.

Supplier

Button world, Waterbaan 342, 1051 PL Amsterdam, The Netherlands, Tel +31-6-16166518, www.buttonworld.nl (EL Panels).

1 The front of the Electroluminescence Panel with the adapter. © Rijksmuseum Amsterdam.

2 The Electroluminescence Panel in use in the examination of an album sheet. All Photos: Dionysia Christoforou. © Rijksmuseum Amsterdam.

Dino-Lite® Digital Microscope

Dino-Lite® Digital Microscope is a portable, optical microscope (10 cm height, 90 g), which offers adjustable magnification between 10 times up to 200 times. It is small and easy to carry. Via an USB port the digital microscope can be connected to any computer. The software provided with the devise is compatible with Macintosh and Windows, updates can be downloaded.

A wide range of about 50 models with various specifications are currently available for the medical-, dental- and the industrial market as well as the heritage sector. Special features of particular models are: IR-examination, UV-examination, also including the option to switch between white LED and UV light, use of special polarization filters, calibration software for performing measurements, and a long working distance for applications like conservation treatments or demonstrations.

Use in Conservation

The digital microscope is easily applicable for in-situ examination since the devise can be freely moved and positioned at any area of an object without the limitations that a fixed microscope presents. The image is directly transferred to a laptop or computer, allowing for more people to view the image on the screen and for documentation. On some models there is a rigid transparent plastic ring at the front of the devise to protect the lens and to keep the optimal distance between the lens and the surface of the object. A direct surface contact allows for easy calibration (Fig 1), however fragile surfaces like powdery media render this impossible. Several stands and holders are available as accessories leaving both hands free for working under the microscope (Fig 2). The Dino-Lite® Digital Microscope allows to record still and moving images, videos, as well as time-lapse recording. That makes it a useful tool for use in training and education.

Disadvantages

Most of the disadvantages are related to the available stands and the provided software. The obtainable standdevices are not suitable for use on art on paper. They are quite instable, inducing minimal camera shake that causes blurred images. Also, the arm often is not long enough to examine central areas of an object. If black-rubber anti-slip dots are attached underneath a stand, they easily rub off leaving dark, soiled traces. For life-demonstration purposes it is important to know that some models show a small time lapse between the live image and the image seen on the screen. The software might cause compatibility problems with other software. The software still requires improvement in the design of calibration bars and adding comments into photos.

The Dino-Lite® Digital Microscope is a valuable equipment for use in the field of book and paper conservation. For more information on buying Dino-Lite® Microscopes, please contact a reseller in your country.

Supplier

Dino-Lite® Digital Microscope, Rijksweg 81 - J, 1411 GE Naarden, The Netherlands, Tel +31-20-6186322, Fax +31-20-6189692, www.dino-lite.eu (Digital Microscope; Prices: AM413T5 - ca EUR 300,00, AM413MT5 - ca EUR 400,00, AM413MZT - ca EUR 475,00).

> If you want to share information on new 'Materials & Equipment' in the field of book and paper conservation, please contact: Claire Phan Tan Luu, Conservation scientist, Cultural Heritage Agency, Amsterdam, The Netherlands, claire.phantanluu@gmail.com; or Dionysia Christoforou, Rijksmuseum Amsterdam, Paper & Book Conservation Studio, Hobbemastraat 22, 74888 Amsterdam, The Netherlands, Tel +31-20-6747-117, Fax +31-20-6747-001, d.christoforou@rijksmuseum.nl

1 The use of the Dino-Lite® Digital Microscope for examination of a drawing in direct contact.

2 Mounting the Dino-Lite® Digital Microscope in a stand for keeping distance to a surface. Photos: Birgit Reissland.

Book Preservation at the Folger Shakespeare Library (II)

The Folger Phase Box with Clear Spine

History of Folger Phase Box

Since the Folger opened in 1932 and made the collection of Henry and Emily Folger available to researchers it has acquired significant additional holdings that make it a world-class research center on the early modern age in Western Europe. As a research library, the Folger's primary mission is to preserve and enhance its collections and make them accessible to scholars. The collection is, therefore, heavily used and shows typical damages for volumes of that age. Often boards are off, head caps are torn or missing, spines are loose or missing, signatures are loose, and the covering is deteriorated and friable.

The Folger Shakespeare Library is a small institution with a conservation department of four conservators, one intern, and one contracted technician working once a month. The number of damaged books in proportion to conservators made it necessary to come up with a temporary housing that is time and cost efficient and can be produced by a technician. A phase box ensures that the book can be safely reshelved in the collection without further damage while the book is awaiting conservation treatment.

Curators and conservators prefer to see the books with their often beautifully decorated spines rather than looking at the flat spine of a box. This also makes it easier to identify books for teaching, study, and exhibition. The Folger Shakespeare Library has a long tradition of close relationships with their members and donors, who sometimes tour the collection and admire the books. Traditional clamshell boxes offer the best protection for the book, but they consume greater time, cost, and space. They also completely enclose the book and when staff is viewing the stacks they cannot see if the book is indeed in the box or not. Therefore, if clamshell boxes are made for our collections they too are produced with a clear spine.

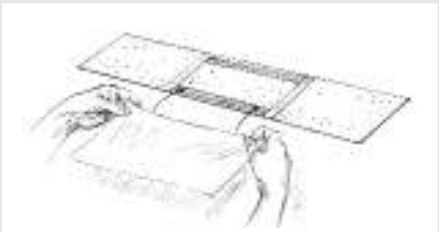
In the late 1970s and early 80s, a simple Mylar wrapper was used to protect books in the Folger's collection. The Mylar (Piedmont Plastics) was trimmed to the height of the book, wrapped around it, and held together with pressure-sensitive Velcro. While this was a very efficient type of housing, the Mylar proved to be useful only for small and light books. Heavy books wrapped in Mylar would easily slip out of that housing, making it extremely difficult to handle. In addition, the adhesive on the Velcro often failed, leaving behind a sticky residue or sometimes worse becoming adhered to the binding. With this in mind, conservators started to design a better but still efficient housing.

Step 1 Making the First Piece of the Phase Box.

Begin with a piece of card stock that is over three times the height of the book plus two times its thickness and slightly larger in width. Check the grain of the card stock. It should run perpendicular to the height of the book. Measure and mark the width of the book and cut the card stock to width. Measure the height and the thickness of the book. Mark, score and fold. The card stock should now have four folds and two flaps.

Step 2 Attaching the Mylar Spine to the Phase Box.

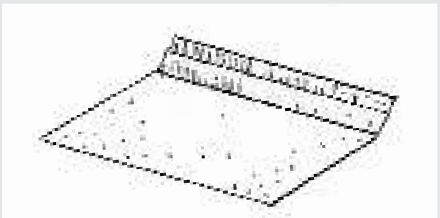
a Place a strip of double-sided tape (3M) on both sides of the middle section of the card stock.



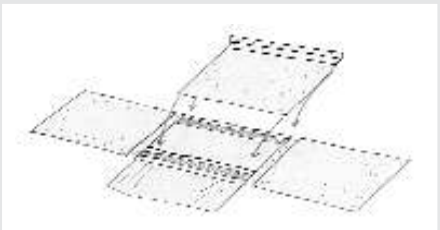
b Cut a piece of Mylar that is taller than the height of the book and wide enough to cover the thickness of the book plus 5 cm or so. Remove the covering of the double-sided tape on the left side of the card stock. Place Mylar onto the tape.

c Place a new strip of double-sided tape on the Mylar. Position it directly over the first strip. Using a knife, carefully trim the Mylar to the height of the book. Be sure not to cut into the card stock.

Step 3 Making and Attaching the Second Piece of the Phase Box.



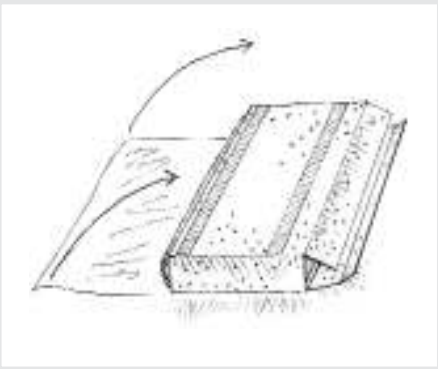
a Take a second piece of card stock the height of the book with its grain running parallel to the height. Mark the width, thickness of the book and 3 cm for the flap.



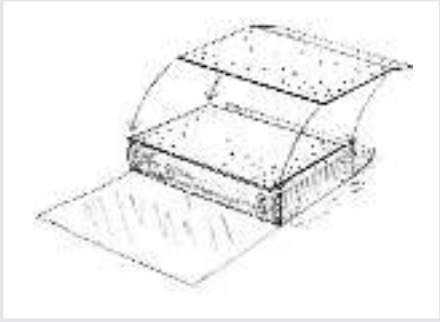
b Account for material thickness when measuring. Trim along the third mark. Score and fold. Attach this piece to the center section of the first one.

Step 4 Making and Attaching the Third Piece of the Phase Box.

a Place the book inside and fold up the two flaps. Take a third piece of card stock with its grain running parallel to the height of the book and cut it to the height of the 'box'. Mark the width adding a hair extra. From this mark, measure the thickness of the book minus 1 cm and trim. Score and fold at the mark.



c Adhere the Mylar to this piece by pulling it over.



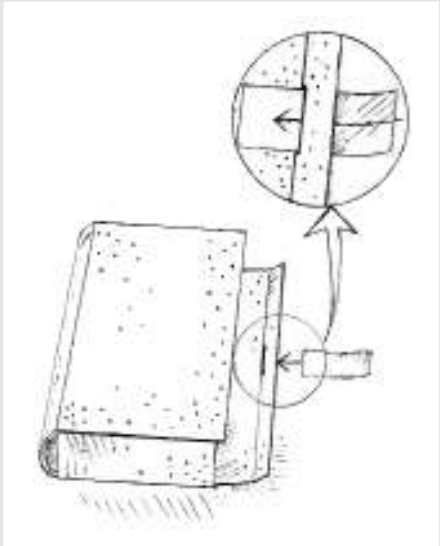
b Place this piece on top of the 'box' and square up your box.Place two strips of double-sided tape, one along the left edge and another on the right side, keeping the same distance from the fold as the width of the flap made in step 3 cm away from the fold. This step can be done before or after placing the third piece on top of the 'box'.

d It is helpful to put a weight on everything to keep it in place. Trim the spare Mylar. Place another piece of double-sided tape directly over the one showing from underneath the Mylar.

Step 5 Making and Attaching the Fourth and Last Piece of the Phase Box.

Take a fourth piece of card stock with its grain running perpendicular to the height of the book and cut it 3-4 mm wider and to the exact height of the box. Attach the piece on top. We cut this last piece perpendicular to the height of the book, because that little overhang on the right-hand side helps to slide in the flap to close the box. It seems to withstand more wear and tear with the grain direction this way.

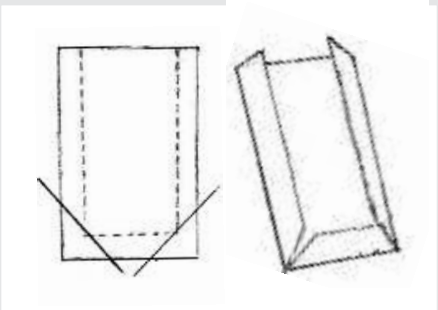
Step 6 Applying the Tab.

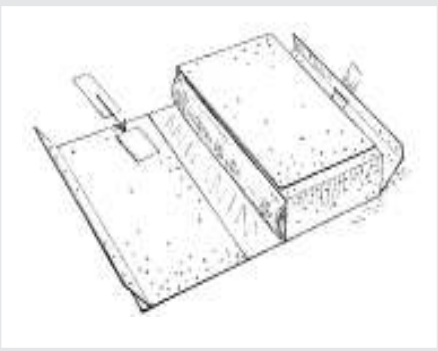


Take a strip of Tyvek (Piedmont Plastics) that is approximately 3.5 cm wide and 5-6 cm long. Cut a slot and lace the tab through - attaching it with double-sided tape.

The prototype of the first clear spine phase box was created in the early 1990s. The phase box needed to meet the following requirements: full protection of the item it houses, constructed with archival materials, a clear spine, easy to use and handle by reading room staff and researchers, simple closures, easy to produce, and cost-efficient. The first phase box met all the requirements except for the closure, which had buttons and braided string. It was not always easy for users to close and the production was too time-consuming. In 2004 the phase box was revised to eliminate the buttons and string closures for faster production. So far this latest revision has been very successful. In an effort to protect as much of the Folger's collection as possible, a contractor comes once a month to the conservation lab just to produce phase boxes.

Step 7 Creating a Pocket for the Call Number Flag.





Call number flags are used throughout the library for easy identification of the items on the shelves. They are made from archival paper and are slipped into a pocket in the box, so the call number is easily read at the top. The pockets are made from an archival paper (approx 120 g.m^2: Bookmakers) and adhered with a synthetic adhesive (PVA, Jade 403: Talas). All drawings: Gabriele Frucht-Azari.

1 Folger phase box housing the rare volume of Ben Johnson's works, 1616. Fig in colours see back cover. Photo: Renate Mesmer.

How to Construct the Folger Phase Box

Before reading how to make the Folger phase box (Step 1-7), remember there is always more than one technique. This technique was chosen to make sure the phase box is perfectly tailored to the book (Fig 1). One might prefer to measure using a ruler rather than using the book to measure. Remember to account for the material's thickness and add that to the measurements described below. Our directions assume the reader is familiar with boxmaking.

Acknowledgement

We would like to thank Gabriele Frucht-Azari (Artist), as well as, Carol Clayton for scanning the images, Nancy Southworth, Erin Blake, and Dan Paterson for reviewing this article.

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Harrison, Garry: Phase Box. Indiana University Libraries <www.indiana.edu/~libpres/manual/treatments/px/front.html>.

Phase Box, Syracuse University Library, Department of Special Collections, Conservation Lab Treatment Manual Series—Phase Box <http://libwww.syr.edu/information/spcollections/conservation/SUConsManual-PhaseBox.pdf>.

Suppliers

All materials used to produce the phase boxes and spacers are archival. The double-sided tape might not fit into this category. Since the book is never in direct contact with it and the 3M double-sided tape has proven to be stable so far, we felt it is acceptable to use.

3M, Corporate Headquarters, 3M Center, St Paul, MN 55144-1000, USA, Tel +1-888-3M, www.3m.com (double sided tape).

Archivart® Products for Conservation and Restoration, 40 Eisenhower Drive, Paramus, NJ 07652, USA, Tel +1-800-804-8428, Fax +1-888-273-4824, www.archivart.com (multi-use double wall corrugated board and library board/folder stock - 20 pt, 508 mm).

Bookmakers, Inc. 8601 Rhode Island Ave, College Park, MD 20740, USA, Tel +1-301-345-7979, Fax +1-301--345-7373, www.bookmakerscatalog.com (strong archival paper approx. 120g/m^2).

Piedmont Plastics Inc, 5010 West WT Harris Blvd, Charlotte, NC 28269, USA, Tel +1-704-597-8200, Fax +1-704-598-7912, www.piedmontplastics.com (Tyvek strip; Mylar).

Talas, 330 Morgan Ave, Brooklyn, NY 11211, USA, Tel +1212-219-0770, Fax +1-212-219-0735, www.talasonline.com (synthetic adhesive PVA, Jade 403).

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A New Method for Flattening Parchment

I would like to present a method for flattening parchment (Fig 1, 2), which I first came across in August 2009 during a symposium at the Istituto per la del Libro Patalogia in Rome. It offers many advantages which the known methods do not have or only partially have: it is a gentle, effective, fast, easy and risk-free application, easy to control and modify and furthermore incorporates economically priced tools. We have optimized this method a little and combined it with the use of a cedar-wood humidifying chamber. I find the results so far so compelling that I wish to make it available to a greater circle of specialist colleagues.

The principle is so simple that one immediately asks why someone hasn't come up with the idea before: it is based on fixing the parchment with magnets onto a likewise magnetic base. The tools are as follows: a galvanized sheet of perforated metal (2 mm thick) which is set into a wooden frame. The size and height of the frame is chosen in order for it to fit into the cedar-wood humidifying chamber made by a carpenter (Fig 3), magnets in different shapes and sizes wrapped in paper or Hollytex (Fig 4). We discovered that the otherwise perfect round Neodymium magnets with stainless steel wire

1 GA 549 b recto: before restoration.

2 GA 549 b verso: before restoration.

3 Document on magnetic frame inside humidifying chamber (cedar-wood with Plexiglas cover).

4 Magnet wrapped in Hollytex.

5 Document clamped with magnets: side view.

6 Document clamped with magnets: top view.

7 GA 549 b recto: after restoration.

8 GA 549 b verso: after restoration.

loop are unfortunately not rustproof (magnets-4you). We therefore packed them in Hollytex (Gabi Kleindorfer). A cedar-wood humidifying chamber is not essential but is highly recommended if tensioning should apply.

The procedure is quite easily described, as was demonstrated in the case of 'Erbbestandsrevers für das Kloster Frankenthal', 2 February 1350 (State Archive Speyer, Gatterer Apparat, Sign F7, No 549 b): The parchment is indirectly moistened in a Goretex sandwich or in the cedar-wood humidifying chamber. Hollytex fleece is fixed onto the perforated metal sheet with magnets and the damp parchment is placed upon it. The parchment is then fixed to the perforated metal sheet with magnets (Fig 5, 6). The fixing is very quick and can be corrected at any time without problem. For irreversibly shrunken parchment, which is often a result of heat-damaged parchment documents, it can be particularly appropriate to make incisions with a scalpel, for example, between the text lines to enable a better placing of the parchment, thus allowing for parts of text which have drifted apart to be fused back together again. When the parchment is sufficiently secured, it is left to dry for several days or weeks. Should a subsequent re-tensioning at certain points be required the perforated metal sheet is simply placed in the cedar-wood humidifying chamber and after the appropriate damping the necessary corrections can be carried out.

The 'after-photo' (Fig 7, 8) present the document in an even, smooth condition. In this case, prior to humidification, the parchment was dry cleaned, melted sealing wax was superficially, mechanically detached from the parchment while the wax, which penetrated into the parchment, was removed using compresses of petrol-soaked sepiolite powder.

To conclude the treatment, after drying, the missing areas were filled in with several layers of Japanese paper and isinglass and retouched with pastel chalk dust; the surfaces on the reverse side of those areas were then completed with a layer of Klucel G dissolved in Ethanol.

Suppliers

Gabi Kleindorfer, Aster Str. 9, 84186 Vilsheim, Germany, Tel. +49-8706-1094, Fax +49-8706-559, www.gmw-gabikleindorfer.de (Hollytex).

magnets4you GmbH, Schafhofweg 16, 97816 Lohr am Main, Germany, Tel. +49-9352-604386-0, Fax +49-9352-604386-20, www.magnet-shop.net (Neodymium magnets with stainless steel wire loop).

Author

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Remoistenable Tissue

Materials

- > gelatine solution 3 % (liquid, tepid; <www.ink-corrosion.org>);
- > polyester film (100 µm; e.g. Melinex, Hostaphan)
- > Japanese paper of your choice (2, 4, 6 or 8 gr/m^2) or Berlin/Gossamer tissue 2 gr/m^2 (Gangolf Ulbricht)

Tools

- > pressure sensitive tape to stretch the melinex if necessary;
- > insect screen gauze to create a gelatine layer of even thickness; the screen size should be larger than the size of the paper;
- > pipette (plastic) to apply the gelatine to the screen;
- > (rubber) squeegee, a flexible rubber square ('Scheibenwischer, Rakel' [DE], 'raclette' [FR]) to spread the gelatine over the screen.

Tools and materials for remoistenable tissue. The purpose of the screen is to control the thickness and homogeneity of the gelatine layer.

Use the pipette to load the screen with the gelatine.

Spread the gelatine with the squeegee and even out the gelatine, add more gelatine if necessary, all of the surface of the screen should be filled with gelatine.

Carefully peel away the screen, start at one corner. Be sure not to slide the screen during this operation. Also be careful at the end: when the screen is of the stiff(er) type it will suddenly sweep loose and brush the gelatine away.

The gelatine layer is now ready to receive the paper: the tissue paper is so thin that is not possible to apply the gelatin directly onto the paper.

Carefully lower the tissue paper in the gelatine, you have more control if two diagonal corners are lightly held between your fingers. Hold the paper so it hangs in an arch. When the lowest part of the arched paper touches the gelatine it will suddenly grip the glue. Now lower the paper carefully and slowly to avoid air bubbles under the paper.

Do not try to pull, stretch or otherwise manipulate the paper: it will distort and/or tear. If there are any airbubbles it is possible to remove them by ever so lightly tapping with a very soft brush. Dry the paper and gelatine on the melinex. It is best to prepare the tissue a day (or more) prior to doing the repair(s).

Prepared remoistenable tissue, different - paper weight. Note that name, weight, supplier of the paper, the adhesive used as well as date of manufacture of the tissue are noted on the margin. Some have already been used in repairs. You can keep these sheets for a long time in a dark and dry place.

Supplier

Werkstatt für Papier Gangolf Ulbricht, Mariannenplatz 2, 10997 Berlin, Germany, Tel/Fax +49-30-6158155, www.gangolfulbrichtpapier.com (Berlin Tissue - Gossamer Tissue)

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- > If you have a clever, pragmatic idea that you want to share with our readers, please contact: Bas van Velzen <elandbas@mac.com>

US-Washington, DC

An Internship in the Library of Congress

This report explores the internship program in book, paper, photograph, and preventive conservation in the Conservation Division, Preservation Directorate, Library of Congress (LoC) for conservation graduate students. A special focus is on the author's experience as one of the 2009-2010 interns in paper conservation. Information about how prospective applicants can apply to the internship program is included.

The LoC in Washington, D.C. is the oldest federal cultural institution in the United States and functions as the research library for Congress, as well as the nation's library. Home to nearly 142 million objects, it is easy to get lost in its magnificent collections of books, prints, photographs, drawings, manuscripts, recordings and much more. These materials are cared for and made accessible to the public in reading rooms, through exhibitions, and online by a large team of curatorial, preservation, and exhibition staff. Conservation is one of the divisions within the Library's Preservation Directorate, which provides conservation treatment and preventive conservation for rare materials and materials at risk. The division is staffed by administrators, book, paper, and photograph conservators, as well as preservation technicians, who work in collaboration with the Preservation Research and Testing Division, as well as other divisions, as necessary.

Since the early 1970s, the Conservation Division has hosted students from conservation graduate programs in search of additional training within a research library context. The breadth of the library's collections and the many responsibilities of the division afford interns the opportunity to engage in examination, documentation and treatment of materials from a variety of collections; create housings for the materials they treat; pursue a research project of their choosing in consultation with the intern coordinator; prepare materials for exhibition; engage in preventive conservation activities, such as collection surveys; participate in lab tours, which attract a variety of visitors from around the world; and attend lectures and meetings offered at the LoC and the many other cultural institutions in Washington, D.C.

As a graduate student studying paper conservation and art history at the Conservation Center, Institute of Fine Arts, New York University in New York, I was fortunate to intern at the LoC for approximately ten and half months. During my internship, I engaged in many of the opportunities just mentioned, a selection of which I would like to share with readers who are interested in learning more about the internship program at the LoC, including prospective applicants.

Examination, documentation, and treatment of materials from a variety of collections, including Prints and Photographs, Rare Book and Special Collections, Geography and Map, Manuscript, Asian, African and Middle Eastern, and Music formed a large part of my internship. Although interns are encouraged to treat materials from a range of collections, one can also request materials or treatments that reflect one's interests. During the examination and documentation of an object or group of objects, I worked with both the conservator and curator associated with the collection to assess the history of the object, its condition, the goals for treatment and its final housing which was dependent upon the anticipated use of the object in the Library. Treatments ranged in complexity from filling the losses in an architectural drawing on tracing paper by Le Corbusier from 1962, to mending the tears and humidifying the creases in a 20th century Thangka painting on fabric, to removing the silk lining from one of the pages of George Was-

1 Letter from James Buchanan to Jonathan Foltz, 1829 (LoC, Manuscript Division, Jonathan Messersmith Foltz Papers Collection): iron-gall ink on laid paper, 25.3 x 40.3 cm, before treatment.

2 Ptolemy's Cosmographia, 1513 (LoC, Rare Book and Special Collections Division, Rosenwald Collection): one example of one of the maps (approximately 44.0 x 60.6 cm) in poor condition.

hington's Rules of Civility from ca 1753 with an enzyme solution.

One project that was particularly exciting was the treatment of a letter from James Buchanan to Jonathan Foltz from 1829 (Fig 1). Writing as a member of the United States House of Representatives from Pennsylvania, Buchanan informed Foltz that he was recommending him for a prestigious position in the Navy. He wrote the letter in iron-gall ink on a small paper folio. The treatment of iron-gall ink is a major research interest of the Library's preservation staff, in part because they are responsible for the care of a large number of objects containing iron-gall ink. The protocols developed by the preservation staff for treating iron-gall ink are well known through numerous publications (Albro, et al., 2008: 129-165; Biggs, et al., 2006: 211-218; Connelly Ryan, et al., 2006: 195-202). Following the Library's protocols, I was able to successfully treat the letter, dramatically reducing the unstable iron content in the ink as revealed through iron (II) tests before and after treatment.

Research also was a major component of my internship. Working in collaboration with a small team of conservators, preservation scientists, and curators, I was fortunate to participate in a multi-faceted research project on Ptolemy's Cosmographia from 1513, which was re-bound during the 18th or 19th century. The atlas is significant because it contains both maps based on Ptolemy's original notes and maps based on European explorations up to 1513 (Fig 2). In 1513, the atlas must have been viewed with much excitement. What a complete understanding of the world's geography. The volume unfortunately suffered from an overly tight binding and wide guards made from thick paper that caused the maps to fracture at their junctures. Additionally, the papers and colourants of the maps varied greatly in condition. The maps in poor condition likely had been treated in the past causing the papers to become soft and the copper green colourant to shift in colour, sink to the verso of the paper, turn brown, and even fracture the paper (Fig 2).

The goal of the Ptolemy project was to treat the maps in poor condition, then to rebind the volume so the maps can be viewed completely without causing harm during handling. To treat the maps it was critical to understand the deterioration mechanism of the copper green pigment, as well as how the maps had been treated in the past. This goal began to be accomplished during my internship through examination and documentation of the maps and scientific analysis of the maps, including hyperspectral imaging and x-ray fluorescence. The project is still in progress and will include additional testing before the maps can be treated and rebound.

In addition to treating objects from the Library's many collections and working on a collaborative research project, I also prepared objects for exhibition, including an oversized map (approximately 1.3 x 1.9 m) of the British and French dominions of North America by John Mitchell from 1755 (Fig 3); rescued moldy books from the stacks after a leak was discovered; and participated in tours of the conservation lab for individuals, and staff from cultural institutions and corporations from around the world. Interning at the LoC was truly a unique opportunity to work with a range of materials in a variety of contexts with numerous conservators, curators, preservation scientists, and other preservation professionals. I learned and appreciated just as much from the objects as from the people with whom I worked. In short, it was a feast of information.

3 Senior Paper Conservator Mary Elizabeth Haude flanked by Paper Conservation Interns, Eliza Spaulding (left) and Nita Maria Greene (right).

Conservation graduate students interested in book, paper, photograph, or preventive conservation internship opportunities at the Library of Congress can visit <www.loc.gov/-preserv/ servpubs.html> to learn more. Typical applicants are in their final year of study at their conservation graduate programs, apply in January to be considered for the internships starting in September, and complete their internships after 11-12 months.

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Université Paris <www.paris-sorbonne.fr>

Hye-Sung Ahn: An Historical Review of Daguerreotype Treatments—The Evolution of Daguerreotype Plate Cleaning

Several historical approaches to daguerreotype treatments were reviewed, in particular the techniques used to clean daguerreotype plates. Problems with the decreasing image legibility of daguerreotypes due to the deterioration of the silver-coated copper support were a concern soon after the invention of the daguerreotype process. Consequently, several methods of cleaning daguerreotypes were developed, some of which are still used today. Methods of daguerreotype fabrication and the various housing systems used (styles and materials) were examined in order to better understand the causes of deterioration.

A literature review of the proposed chemical and electro-chemical methods of daguerreotype cleaning was also conducted. This information provides a greater understanding of the different cleaning methods: advantages, associated risks, and precautions necessary during the cleaning process. In order to gain experience with these treatment techniques and to better compare their respective results, three cleaning methods using thiourea, hydroxide ammonium, and electro-cleaning (proposed by Susan Barger in 1986) were tested on two daguerreotype plates.

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Example of a damaged Daguerreotype. © H-S Ahn.

Université Paris <www.paris-sorbonne.fr>

Leïla Sauvage: Powder and Paper—The Conservation of Friable Media Drawings

Pastel, chalk, graphite and charcoal drawings belong to the group of 'friable dry techniques'. The fragility of these media sometimes prevents them from being conserved, exhibited or loaned. This study aimed to investigate approaches to the conservation of friable media.

The first goal was to provide an overview of the technical data available on these media including support, mounts, and frames, as well as the possible conservation techniques. It describes actions that create problems specifically related to these media and solutions that avoid damage. The treatments studied include unframing and unmounting, surface cleaning, mould treatment, stain removal, fixation, mending and lining, humidification, flattening and retouching. The analysis of these treatments, which is based on professional experience in conservation laboratories and published information, attempts to give an outline of the risks and advantages involved with each method.

The final section describes the protective structures of mounts and frames that have been used in the past and the conservation strategies used today. It also includes a comparison between three ongoing reframing projects at the Musée du Louvre of Paris, the Rijksmuseum Amsterdam and the National Museum of Stockholm.

The second goal was to highlight the lack of knowledge in the field of friable media. Some aspects that require further research include the analysis of fixatives, mould treatment, the improvement of flattening methods, the climate inside frames and transportation and exhibition methods. The problems caused by transportation within and between museums or galleries and the way to reduce the effects of vibrations will be the subject of a doctoral thesis.

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Microscope view of charcoal strokes on paper, x120. © L Sauvage.

L'Institut National du Patrimoine <www.inp.fr>

Violaine Blaise: *The Conservation of a Japanese Puppet Costume Using Micro-Dot Pasting*

This diploma project concerns a Japanese puppet belonging to the French National Library in Paris and probably dating from the 19th century. The object is made of composite materials and wears a costume of kinran textiles, figured fabrics with decorative wefts consisting of thin paper strips. The fabrics are lined

with recycled papers, probably transaction documents. The consolidation method for the fabrics was inspired by a technique perfected by the Japanese paper conservator, Katsuhiko Masuda: so-called micro-dot pasting. This method involves applying adhesive to the support material in dots instead of a full surface coating. Masuda uses magic tape to create a dot effect but here a technique was developed using a fine plastic net that allows a thin and even adhesion.

Tests showed that this method increased the flexibility and reversibility of the support and significantly reduced the quantity of adhesive required. The very good behavior of the tested samples during thermo-hygrometric changes allowed the use of silk or Japanese paper for the support of textiles. Thanks to this method, using a reduced moisture lining technique, the textiles and the papers of the costume could be supported without being completely dismantled.

The puppet's costume was then consolidated with a combination of different techniques; the random 'pasting' of silk and Japanese paper, and sewing techniques.

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General view of the japanese puppet after its conservation treatment. © INP / G Vanneste.

L'Institut National du Patrimoine <www.inp.fr>

Elodie Remazeilles: *Disposable Paper Dresses by Paco Rabanne—An Investigation into Wet Treatments and Their Impact on a Laminated Embossed Paper*

This research concerns the conservation of a laminated embossed paper, the main component of three paper dresses from the Musée de la Mode et du Textile, Les Arts Décoratifs (Paris), designed by Paco Rabanne in the 1960s. Industrially made, these disposable garments also present coloured adhesive tapes, polystyrene fibres and metallic snap fasteners. Their short-lived function and the audacious combination of various materials constitute an obstacle for exhibition and long-term conservation.

The lack of research concerning tissue-paper conservation led to an investigation into its resistance to conservation treatments like cleaning and flattening. The investigation was particularly focused on methods using humidity: their application (poultices, wet blotters, ultrasonic humidifier etc.), their efficiency (reduction of stains and folds) and their impact on tissue-paper properties (preservation of bulk and embossing). The choice of an appropriate solvent combined with these different techniques completed the investigation. The abilities to dissolve degradation products and plastics, and adhesive sensitivity were the major factors in guiding selection. Several techniques of evaluation were used: visual observation, optical microscopy, pH measurements, colour measurements, rugosimetry, mechanical resilience and pixel binarisation. The results facilitated the estimation of the strength and limitations of laminated embossed paper and the selection of adapted conservation treatments. The treatment of damaged trimmings and adhesive tapes was another important aspect, mainly concerned with the reduction in deformation of plastics using mechanical-stress based methods and local reinforcement using adhesives.

General view of a paper dress designed by Paco Rabanne after its conservation treatment. © INP / G Vanneste.

A new exhibition system appropriate to the dresses' fragility was created consisting of a flannelette lining backed with a rigid Nylon® cloth inserted under the dress. This temporary support decreases tensions associated with the vertical display by evenly supporting the object. A metal base with a simple T shape was also made. Designed not only as a discreet support system, it also facilitates handling and can be used to accompany the dress on loans.

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> If you want to provide abstracts of master-thesis degree works in the field of book, paper and photograph conservation, please contact Istvan Kecskemeti, PhD, National Archives, Head of Archiving Techniques Unit, PL 258, 00171 Helsinki, Finland, Tel +358-9-22852337, mobil +358-50-5675887, istvan.kecskemeti@narc.fi

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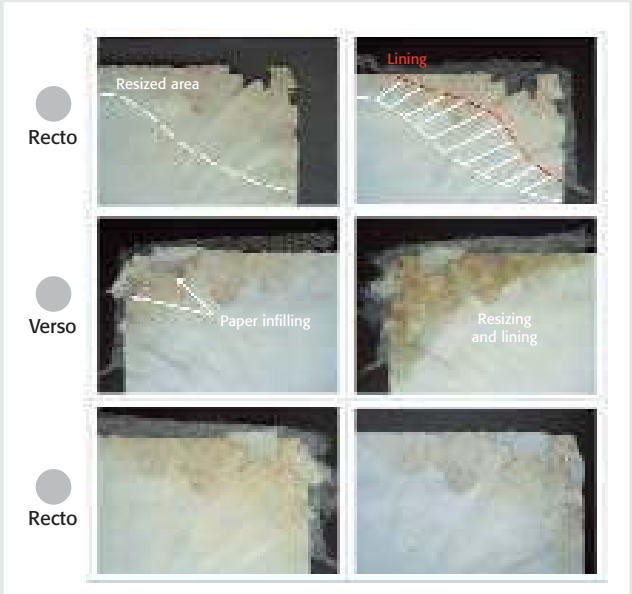
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