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The European Research Centre for Book and Paper Conservation

The European Research Centre for Book and Paper Conservation - A melting pot for people with various backgrounds and concerned with the survival of our written and graphic cultural heritage.

In view of the common needs of conservator-restorers, librarians, archivists, and anyone concerned with the preservation and conservation of our European written and graphic cultural heritage, joint efforts have resulted in the setting up of a new centre for research on book and paper conservation. On the basis of, both scientific and humanitarian aspects, it is the aim of our research to facilitate the daily activities of all those working with the heritage in question. Although the ongoing research is valuable, research at the universities, in particular, tends to be slow, because every new student has to be introduced to the problems from scratch. However, microorganisms, leather decay, non-aqueous ink treatment – to name only a few issues – are confronting conservators all over Europe with serious problems and call for urgent action.

It is evident that we have to preserve our Pan European written cultural heritage (including graphics, prints...) as a basis for the development of our societies. And because Europe's cultural roots in written traditions, from the Antique period until today, are book based, the survival of this written heritage is of utmost importance.

The Aims of the European Research Centre for Book and Paper Conservation-Restoration are

- **to do research in the field of Book and Paper Conservation-Restoration**
- **to communicate research results to those who can apply them to the heritage.**

On the basis, of a Europe wide evaluation the Centre was founded on 22 March 2010. The centre is carried by a multidisciplinary international board and a growing number of member institutions.

The Centre is located in a castle renovated in 2008.

The choice of venue is justified by the history and tradition of Horn, i.e., printing presses and paper mills since the 15th century, Berger Printing Press (one of the largest in the country), a Book art biennale held for the past 20 years, printing with children, etc.

The activities of the past 6 months

From 11th to 13th May 2011 the first CONFERENCE was held under the title „New Approaches to Book and Paper Conservation“, and attracted over 150 interdisciplinary experts from 40 countries. Over 50 contributions focused on the question: what do we need in terms of research at this time to conserve and maintain our written cultural heritage in Europe?

The results of the conference in brief:

- Eleven research topics were identified
- Answer to the Green Paper for FP8 was sent
- Wish for a conference to be held every other year
- The numerous feedback mails stressed the high quality of contributions, personal benefits...
- It was felt that Horn is an attractive and suitable venue
- Fully edited preprints available at the conference were appreciated

Since March 2010 several co-operations have been established. Individual members (fee 85 Euros per year) get the newsletter with top quality articles and information on upcoming activities as well as reduced fees for professional development courses. Institutional members do not pay a fee and benefit from NETWORKING and the sharing of knowledge and experience.

Cooperation with external institutions is also possible, for example for universities and students. Student grants (ERASMUS) can be for used for joint projects of their home university and the Centre. For the time being, the Centre has announced 2 projects: Laser cleaning with BAM Berlin Dr. Krüger and Armenian paper with University of Fine Arts Vienna, Dr. Schreiner.

In accordance with the second core aim of the Centre, i.e., the communication of research-results to those who can apply them to the heritage, a number of advanced professional development courses have been scheduled. A first course, dedicated to Parchment assessment, was held by René Larsen and his team in May 2011. 20 Participants from 11 countries participated. It was intended as a dissemination activity after the EU IDAP project.

The centre welcomes any ideas, wishes, requests, contributions, co-operations and suggestions. Furthermore, you are cordially invited to visit the Centre's webpage www.european-research-centre.buchstadt.at for the latest news

Scientific article

Documentation of Watermarks in Paper [*]

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Summary

Historians, librarians, keepers of the archives as well as art historians and conservators use the history of paper, especially the watermarks, for the identification and dating of historic papers such as documents, books, manuscripts, autographs, prints, drawings etc. Examining paper structure and watermarks by transmitted light and UV-photography (Dylux®-procedure) are not very satisfactory, especially when the paper is heavily printed or drawn. X-ray radiography as well as beta radiography can yield valuable information that is otherwise difficult to obtain, especially in the form of a permanent record. Compared to other techniques such as tracing frequently applied in order to achieve a real reproduction of the watermarks both x-ray and beta radiography are absolutely non-destructive as the structure of the paper and the marks are preserved for the future.

Introduction

Historians and bibliographers dealing with manuscripts and codices as well as art historians and conservators dealing with graphic art works are immediately confronted with problems when studying watermarks as well as chain and laid lines as evidence of the date and place of a paper's manufacture. Researchers can readily discern watermarks when they hold a sheet against light, but usually they are unable to record and reproduce this evidence with precisions. As part of a project launched at the Academy of Fine Arts in Vienna in cooperation with the Austrian Academy of Sciences, comparative studies using so-called non-destructive methods have been carried out in order to obtain images of watermarks in their actual dimensions. The subjects of investigation are primarily artefacts such as woodcuts, etchings, and engravings and the results will be used for building up a digital catalogue, which can be used for the dating of artefacts. Various digital catalogues of watermarks in manuscripts or codices are available, especially for the Middle Age (see references 2, 6). Due to the great number of paper mills which existed in the Renaissance and Baroque periods our studies focused on the well known works of several artists.

Methods used for the determination of watermarks

According to the guidelines (9) of the International Association of Paper Historians various methods are proposed for the determination of watermarks and their reproductions: tracing by hand, transparency photographs, rubbing, the Dylux® method, and the Phosphorescence technique.

In the present study the Dylux® method as well as beta-radiography and soft X-ray and

scanning in the reflection and transmission mode were applied to obtain an image of the watermark in its actual dimensions.

Dylux® method

Dylux® is a non-water soluble, pH neutral photosensitive paper developed by DuPont Corporation for proofing photographic negatives. More than 25 years ago Thomas Gravell (5) began experimenting with bibliographical applications for Dylux® and has developed a set of working procedures for its use. The great advantage of this technique is that one can work in daylight. With our purpose-built equipment the photosensitive paper Dylux® 503 is placed upon the object and exposed to visible light (410-500 nm). The visible light is projected through the object and obviously passes more readily through the watermark than other thin areas of the paper's structure. Subsequently, the photosensitive paper is exposed to UV-radiation (200-400 nm). The less exposed parts turn to a deep shade of blue, whereas the yellow coating turns white in the more exposed areas.

Usually, the exposure time with our purpose-built apparatus varies for visible light between 1 and 15 minutes, and for the UV light the exposure is just 1 minute.

Beta-radiography

Beta-radiography (5, 7) has been the most popular method, although it is expensive and rather slow. A dark room equipped with a red photographic safe light and a light-tight box or opaque black cloth bag or wrapping material for protection from light during lengthy exposure times are required. Furthermore, thick rubber or thin latex gloves containing 30% lead have to be available in order to protect the hands from exposure to beta-radiation. To make a radiograph of an object (e.g. a sheet) it is placed between the radioactive plate and the film, with the resulting sandwich then left to effect the exposure. Very close contact between object and film is required to ensure a sharp image on the film. The exposure time is relatively long (4-8 hours) and depends on the mass of material penetrated by beta rays.

In our case the external source was a beta-radiographic plate, being polymethylmethacrylate with approximately 150 mCi/g of radioactive carbon-14 embedded in it. As a detector Kodak Bio Max MR 18x24 cm² film was used, which is a very high speed radiographic film. The size of a film is determined by the size of the beta plate.

Soft X-ray radiography

Soft X-ray radiography (3, 4) is a quicker method than beta-radiography, but the equipment is very expensive and microfocus radiography can only take in a relatively small area (Fig.1). For this method a darkroom equipped with a red photographic safe light it also required. The external source of X-rays is an X-ray machine, which will operate in the 4-10 kV range. For permanent recording any high quality industrial radiography film, such as Agfa Strukturix D4 or D2 can be used. If close-up inspection of radiographs is intended it may be helpful to use single-sided emulsion radiographic films.

In our studies we used soft X-rays generated by an instrument made by Balteau Belgium (Baltospot BL 100/5) and absorption varies depending on thickness, density, and the composition of paper. These variations in X-ray absorption at low voltage (8-12 kV), are recorded on a film. The film (Agfa Strukturix D2) is sandwiched with the paper object so that no other layer, however thin, interferes.

It should be mentioned that all images presented in this paper were obtained by scanning

the objects as well as the Dylux® images and the beta and X-ray radiographic films with a Hewlett Packard scanner (model Scan Jet 4p) and by image processing using Photoshop 7.0.

Case study: Copper engraving **Fides** by Johann Christoph Weigel, 18th century

In order to give an overview of the results, which can be achieved by the various methods described above, in Fig. 2 a graphic art work of the 18th century is presented. Already in the transmission scan (Fig. 3a) the watermark can be perceived in the red-framed area, but no details can be seen because the printing ink disturbs the watermark's image. In some regards more information can be gained from the image obtained by the Dylux®-method (Fig. 3b). This figure clearly depicts the watermark image which is a snake coiled on a shaft or column based on a coat of arms with the monogram NMH. However, again the printing ink interferes with the Dylux® image.

All details are more or less visible in the beta-radiograph (Fig. 3c), although the image is partly diffuse due to poor film/object contact. In comparison, the X-ray image (Fig. 3d) clearly depicts all details as designs made using carbon ink do not absorb soft X-ray radiation.

Conclusion

The advantages and disadvantages of scanning an object in transmission mode, Dylux® -method, beta and X-ray radiography used for the visualisation of watermarks have been studied extensively and works of art could be investigated systematically in various collections such as the Printing Collection (Kupferstichkabinett) of the Landesmuseum Joanneum, Alte Galerie in Graz, Austria, or the Printing Collection (Kupferstichkabinett) of the Academy of Fine Arts in Vienna, Austria. For artefacts the non-destructive nature of a technique is in some cases even higher than that for manuscripts. Our investigations have shown that all four methods used yielded actual size images of watermarks. However, paints and materials used for printing can interfere with the Dylux® – method during the scanning, whereas no interference occurs with beta and X-ray radiography.

It is well known that the long term stability of Dylux® paper is not high and that beta-radiography is expensive and time-consuming. X-ray radiography is also expensive, but much faster and yields more details than beta-radiography.

Acknowledgments

Dr. Alois Haidinger of the Austrian Academy of Sciences, is gratefully acknowledged for carrying out the beta-radiography examinations.

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- (8) Tschudin, Peter F., *Grundzüge der Papiergeschichte*, Bibliothek des Buchwesens, 12 (2002), Anton Hirsemann.
- (9) International Standard for the Registration of Papers with or without Watermarks. IPH International association of paper Historians, version 2, 1997.

List of Figures

Watermark is hardly visible as the printing ink is also documented.

(The watermark is clearly visible, as the design in carbon ink and most other printing media do not absorb soft x-ray radiation.)

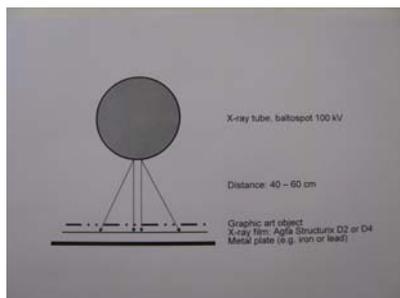


Fig. 1: Scheme of X-ray radiography

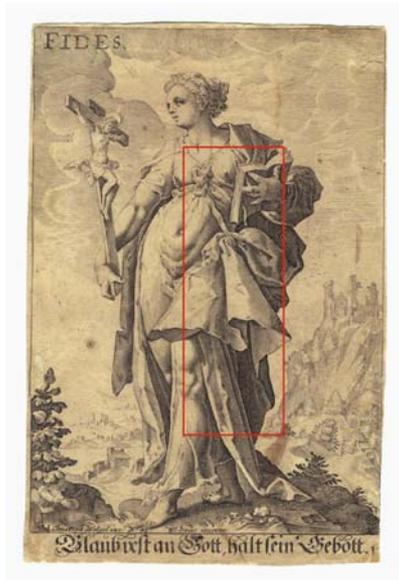


Fig. 2: Fides by Ch. Weigel († 1746) after a copper engraving by H. Goltzius. The area containing the watermark is framed in red.



Fig. 3a: Image of the area with watermark in transmission mode

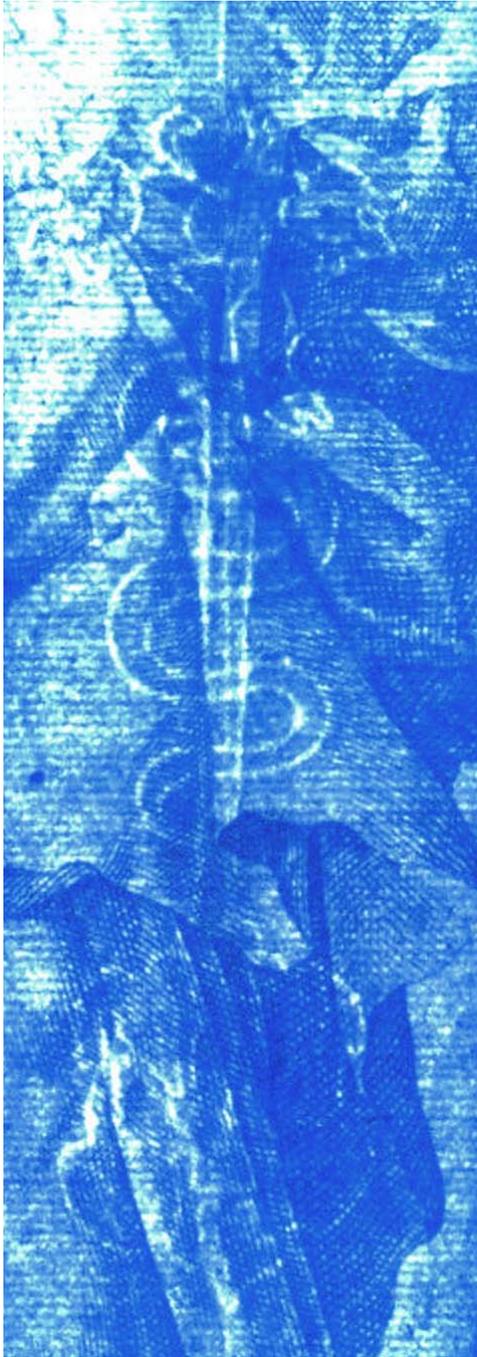


Fig. 3b: Dylux® image of the watermark. The watermark is hardly visible (snake on a shaft/column with the monogram NHM in the coat of the arms).



Fig. 3c: Beta-radiograph of the watermark, which is clearly visible but partly diffuse due to the poor contact of the film to the object.



Fig. 3d: X-ray radiograph of the watermark

[*] A comprehensive description of the project and of the results obtained for artworks can be found in:

1) Schreiner, Manfred; Wallner-Holle, Helmgard. *Determination of watermarks by non-destructive techniques – comparative studies*. In: R. Graziaplena, M. Livesey (eds.): *Paper as a Medium of Cultural Heritage – Archaeology and Conservation*. Istituto centrale per la patologia del libro, Roma 2004, 142-152.

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- 6) Schreiner, Manfred: *Zur Aufnahmetechnik der Wasserzeichen*. In: C. Reiter, *Wie im wachen Träume – Zeichnungen, Aquarelle, Ölskizzen der deutschen und österreichischen Romantik*. Verlag Anton Pustet, Salzburg – München (2006) pp.450-453.
- 7) Schreiner, Manfred; Melcher, Michael: *Visualisierung der Wasserzeichen und Analyse der Zeichenmaterialien mittels Röntgenstrahltechniken*. In: C. Reiter, *Ideal und Natur – Zeichnungen und Aquarelle von Joseph Anton Koch und Johann Michael Wittmer*. Mury Salzmann, Salzburg – Wien (2011), pp. 322-326.

Scientific notes

Contributions of working group on codicology

06.07.2011

Dear colleagues,

The following text is the outcome of one of the group discussions that took place after the official closing of the conference in Horn on 11 May 2011. Their purpose was to choose an essential subject from the papers presented at the conference and regard it as a potential for any present and future European cooperation through the activities of the Centre in Buchstadt Horn. In this case the participants were Dr. Theresa Zammit Lupi, Dr. Gaiane Eliazyan, Dr. Ekaterina Andreeva, Mariana Lucia Nesfântu and Tatjana Timchenko, with Dr. Elissaveta Moussakova as moderator*.

1. To prepare / or synchronize a common structured document for describing the physical condition of manuscript and other collections.
2. On the basis of this document, to carry a survey of the **real physical condition** of manuscript (and archival) collections, be they of parchment or paper documents – to think about application of a method to achieve reliable data, which would surpass the “eye” method. It could be started as a pilot project and within a relatively small group of libraries. An example of how to start was given with the questionnaire prepared by the Bulgarian Library and Information Association and circulating now among various bigger and smaller libraries with the aim to evaluate the real situation of the preservation strategies and equipment around the country. The data relevant to the discussed topic could be accomplished in a similar way to serve as a starting point (platform) to a more general action of improving the preservation, restoration and conservation strategies and practices. Also, it could lead to more effective synchronizing of efforts on European (or at least regional) level even to the extend of restoring documents under international supervision, in any case when the local expertise could be considered insufficient. Putting the survey in action could also be connected with special training, continuous education etc.
3. Parallel to it, to collect information about bindings, they present state, methods of restoration and to explore the possibilities to make use and further develop the achievements of LIGATUS in regard with the terminology of binding descriptions.

4. To study the already existing structured descriptive forms concerning bindings and try to synchronize on a broader level the put-in of information.
5. Following from 4, to think about forms of cooperation with LIGATUS and with various national institutions with collections in order to move towards standardization of the related to the bindings restoration practices and terminology (here we have had in mind that in part of the East European countries such activities are still rare and scarce).

* The paper was compiled by E. Moussakova and T. Timchenko, sent to all the members of the group and read, revised and approved by G. Eliazyan and E. Andreeva.

The upcoming events

- [Recognizing, Classifying and Manufacturing Decorated Paper](#) | 21st – 23rd February 2012 – Lecturer: *Mag. Ilse Mühlbacher*
- [Bosses and Clasps – Basics in Clasps Conservation](#) | 12th – 13th March 2012 – Lecturer: *Mag. Elisabeth Krebs*
- [Manuscript Archaeology - a Step into Manuscripts Biography](#) | 3rd - 4th May 2012 – Lecturer: *Inês Correia*
- [Understanding of the Parchment in the Medieval Manuscripts](#) | 21st – 26th May 2012 – Lecturer: *Jirí Vnoucek*
- [Identification of European Paper – you only see what you know](#) | 4th - 8th June 2012 – Lecturer: *Dipl. Ing. Gangolf Ulbricht*
- [Identification of Asian Paper – you only see what you know](#) | 10th – 14th June 2012 – Lecturer: *Dipl. Ing. Gangolf Ulbricht*
- [Was uns die Papiere verraten](#) | 17. und 18. Juni 2012 – Lecturer: *Dr. Georg Dietz* (during the course there will be also the exhibition Ochsenkopf und Meerjungfrau - Papiergeschichte und Wasserzeichen vom Mittelalter bis zur Neuzeit)
- [The Understanding and Analysis of Organic Materials in Art](#) | 3rd – 7th September 2012 – Lecturer: *Dr. Jan Wouters*
- [Using Cyclododecane in Paper Conservation Practice](#) | 2nd November 2012 - Lecturer: *Prof. Salvador Muñoz Viñas*
- [Hyperspectral Images](#) | Spring 2013 – Lecturers: *Roberto Padoan and Marvin Klein*

The course fee includes accommodation!

At the moment we are establishing a bilingual course system in English and Russian, as to reach a truly European dimension. It is still a reality that we are having 2 widespread languages: English and Russian.

Furthermore we are working on a Symposium on Armenian manuscripts in autumn 2012.

Thanks

We would like to thank all the volunteer helpers, who made the European Research Centre

come reality. Those who helped perform the conference in may, those who corrected publications of the research centre, those who made suggestions of various sorts to develop and maintain the centre and those who contributed scientifically.

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