

The use of digital imaging to record watermarks

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Abstract

In late 2004 the Centre for Cultural Materials Conservation, the University of Melbourne, began remounting approximately 2,000 prints and drawings held in the Baillieu Library, The University of Melbourne. Conservator Louise Wilson and technical assistant Louise Bradley decided to record watermarks found in the papers. Several methods of recording watermark images were considered, including beta-radiography and Dylux® imaging papers, but the decision was made to use digital photography. Images are recorded using a Nikon D70 digital camera with manipulation in Photoshop to clarify the images. It is hoped that the watermark images will be a useful addition to international watermark archives, especially the archives of watermarks found in the papers used by Albrecht Dürer and Rembrandt.

The collection

In 1959 Dr John Ord Poynton donated his collection of approximately 3,000 prints to The University of Melbourne, forming the foundation of the Baillieu Library print collection. Purchases and other gifts, including the Harold Wright bequest of 1964, have enriched the collection. The collection has examples of the variety of graphic processes, including woodcut and wood engraving, copperplate and steel engraving, and the intaglio processes of etching, mezzotint and aquatint. Dr Poynton formed it as a teaching collection so examples of contemporary and later copies of master prints are included in his gift. The oldest work in the collection, dated around 1460, is *Crucifixion*, a woodcut by an unknown artist. Other highlights are prints by Martin Schongauer, Albrecht Dürer, Heinrich

Aldegrevier, Hans Baldung, Hans Sebald Bartel Beham, Albrecht Altdorfer, Hendrik Goltzius, Rembrandt van Rijn, William Hogarth, Francisco de Goya y Lucientes, Claude (Le) Lorrain and Lionel Lindsay.

The remounting project

In late 2004 the Centre for the Conservation of Cultural Materials, The University of Melbourne, received funding from the Meigunyah Foundation to remount approximately 2,000 prints and drawings in the collection of the Baillieu Library, The University of Melbourne. The aim of the project is to stabilise the collection, improve storage and ensure the longevity of the works. The remounting will also facilitate access to the collection by students and art historians.

A print that is currently in an acidic mount is removed and has old glassine, paper or linen hinges removed and any urgent treatment done by a conservator. Unmounted prints stored in paper folders receive urgent treatments such as tear repairs. All works are then mounted in 4-ply Rising Museum rag board in standard-size mounts and housed in Solander boxes. The works are also checked for condition and future treatment requirements are noted.

The watermark project

At the start of the remounting project, conservator Louise Wilson and technical assistant Louise Bradley decided to record watermarks found in the papers in the hope that the information would be valuable for students using the collection, and would make a useful contribution to the international watermark archives. The imaging and study of watermarks is valuable for research into artists' working methods, the production of prints, the history of trade in paper and for dating and authentication of works on paper. Reference books such as Briquet (1968) can be used to identify watermarks.

Investigating imaging methods

Several methods of recording watermark images were considered, including beta-radiography, X-radiography and Dylux® imaging papers, but the decision was made to use digital photography. Several issues influenced

this choice. We felt that we should keep the cost of the watermark imaging low in terms of both material and labour because we were limited by budget and because the collection was formed as a teaching collection and contained some facsimile prints. Recording the watermarks by tracing was not seriously considered since it would be impossible to get an exact image of the full watermark and the chain and laid lines. Beta-radiography was not pursued because of the difficulty of sourcing a beta-radiography plate, the cost of the plate and the cost of the licence to use it. Making a watermark image using Dylux® pH-neutral photosensitive papers is done by shining blue daylight fluorescent light through a watermarked paper placed on a sheet of Dylux® proofing paper (Allison 1999). Dylux® imaging paper was only available in a very large roll and had a suggested shelf life of one year, and the resulting images had to be scanned and altered in Photoshop for use. X-radiography would have required moving the unmounted prints off site to an X-radiography facility and then back to the lab for mounting.¹ A long-term goal of the project is to include the watermark images of the Baillieu collection on the web. A direct digital method is the most immediate method and avoids the need for scanning. Our faith in the use of a digital method was reinforced by an article on the use of an ultra-high-definition digital camera for imaging watermarks in manuscripts (Moschini 2000: p188).

Making the digital images

The images are recorded using a Nikon D70 digital camera. The majority of the prints are illuminated with transmitted light, but sometimes the use of raking light results in a better image. The camera is set in detail mode, on automatic exposure and without flash. The camera lens is a 60 mm 1:2.8d autofocus micro. The general approach is that each print is placed face down on a sheet of UV-filtering acrylic and placed over a CLE Lightsheet on a copy stand. The CLE Lightsheet is a portable, flexible, A4-size, paper-thin, white light source that remains cold throughout use. It can be slid between the pages of a book or underneath mounted prints to

¹ For a thorough article on X-radiography of watermarks see Brown and Mulholland, 2002.

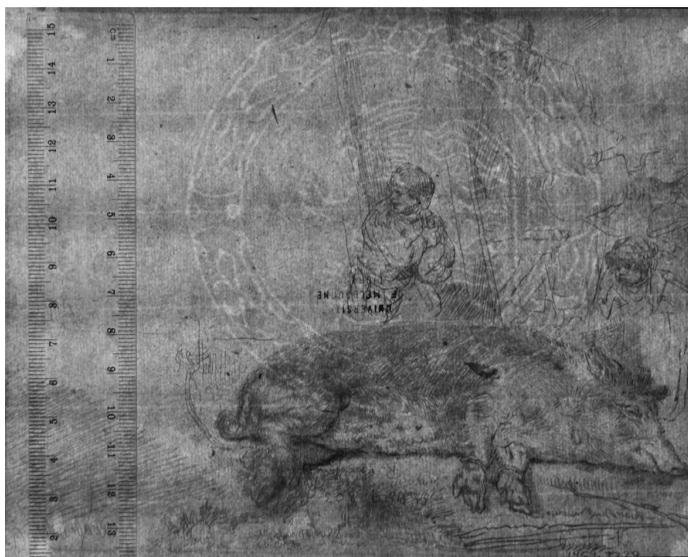


Figure 1. Digital image of watermark in the paper of Rembrandt's *The Hog* (1643), B157 (1959.3729).

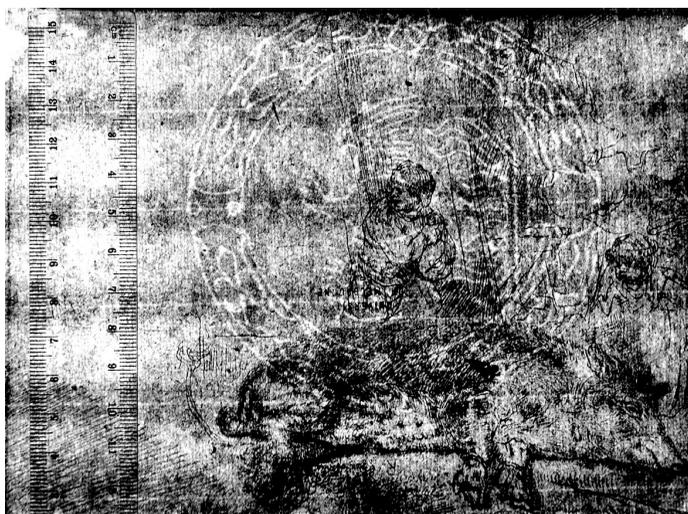


Figure 2. The digital image from Figure 1 after manipulation in Photoshop.

examine watermarks. The edges of the print are masked and a transparent rule is laid over the print near the watermark. The camera is mounted above the copy stand and images are taken in a dark room using just the lightsheet to illuminate the object.

Altering the images

The digital images produced are generally very clear (Figure 1). Images are manipulated in Photoshop for clarity by choosing the colour channel which shows the clearest image, adjusting highlights, mid-tones and black tones using the curve chart, changing the image in mode to greyscale, and using the dodge tool to raise highlights and the burn tool to increase shadows. The un-sharpen mask can be checked under the filters menu, selecting amount 100%, radius 1.5 pixels and threshold 0. The image is saved with embedded colour profiles (Figure 2).

Where a watermark is partially obscured by dense ink, the digital image of the watermark is incomplete. In cases such as this, beta-radiography or X-radiography may have yielded better results. It is also possible that a camera with higher definition would provide digital files that could be enhanced more deeply.

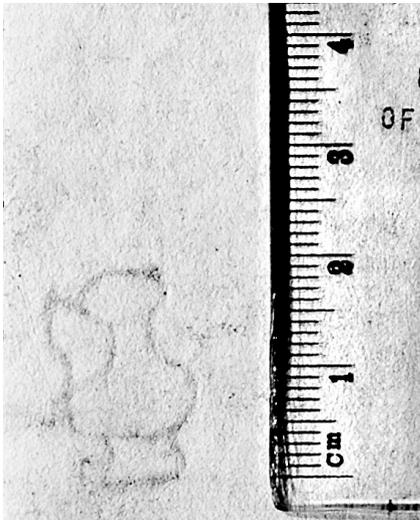


Figure 3. Digital image taken in raking light of small jug watermark in the paper of Albrecht Dürer's *Madonna with the Swaddled Infant* (1520) B 38, (1959.2100). This watermark is similar to Briquet #12539 and #12548 V4.

THE BAILLIEU LIBRARY COLLECTION WATERMARK ARCHIVE	
Artist	
Country	
Date	
Title	
Accession Number	
Catalogue Number	
Watermark type/variant	
Identical images	
Very similar images	
Closely related images	
No closely related images	
Digital image recorded // note if taken from recto or verso	
Paper thickness approximate g/m ²	
CLI - (minimum and maximum)	
LLI - (minimum and maximum)	
Description of paper	
Recto (note which is the mould side)	
Verso	
Country of manufacture of paper	century
Type	
Fibre	
Sizing	
Filler	
Surface	
Remarks	

Figure 4. Watermark archive sheet.



Figure 5. Digital image of watermark in Lucas Cranach's *A Youth on Horseback*, (1506) B152 (1996.2114). This watermark is similar to Briquet #12526 and V4.

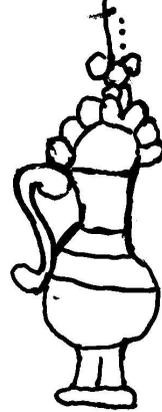


Figure 6. Tracing of the watermark in Figure 5.

Imaging with raking light

Where a watermark is not visible in transmitted light, it is photographed using raking light across the verso of the sheet. The image is then manipulated for clarification of the watermark (Figure 3). Unfortunately chain and laid lines are not as clear in raking light as they are in transmitted light.

The watermark archive

Information about the print, the paper it is printed on and the watermark are recorded on a watermark archive sheet. The sheet is modelled on the

watermark archive sheet used by the National Gallery of Art, Washington (Figure 4) (Ash 1986: p68). The spacing of the chain lines and the number of laid lines per centimetre are recorded. The paper is weighed and the approximate g/m^2 is calculated.² Measurements of the watermark are recorded using the method developed by Allan Stephenson, where the height and width of the watermark are recorded in a way that shows the location of the mould wires (Ash and Fletcher 1998: p30). Brackets enclose the watermark and vertical lines signify the chain lines. For example, the watermark found in the Lucas Cranach print *A Youth on Horseback* (Figures 5 and 6) is recorded as $65 \times 18[2|20|2]20$. The watermark is 65 mm high and 24 mm wide (24 mm being the sum of the numbers inside the brackets). The watermark sits 18 mm away from the closest chain line to the left and 20 mm from the chain line on the right side. The watermark is tied over two of the chain line wires and the space between chain lines is 20 to 22 mm.

A tracing of each watermark is made onto Mylar™ using transmitted light over a lightbox. The tracing and watermark archive sheet are filed in hard copy.

Conclusion

While we are not able to make identifications of the paper types or the watermarks yet, it is hoped that the information recorded is a good foundation for further study of the Baillieu Library collection. It is also hoped that the digital images of the watermarks will be a useful addition to international watermark archives, especially the archives of watermarks found in the papers of Dürer and Rembrandt prints.

References

- Allison, R. 1999. The archive of watermarks and papers in Greek manuscripts. Accessed 10 October 2007. Available at http://abacus.bates.edu/Faculty/wmarchive/Dylux_method.html

2 Calculate g/m^2 by dividing the weight in grams X by 10,000 by the sheet area in cm^2 . Thanks to Ruth Shervington, paper conservator, National Gallery of Victoria, for this information and for information on the use of Beta-radiography in the NGV.

- Ash, N. 1986. Watermark research: Rembrandt prints and the development of a watermark archive. *The Paper Conservator* 10: 64–69
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- Brown, E. and R. Mulholland. 2002. Using micro focus X-radiography and other techniques to create a digital watermark database, IIC preprints. International Institute for Conservation Annual Meeting, Baltimore; Washington, D.C.: AIC. 21–26
- Moschini, D. 2000. La marca d'acqua: A system for the digital recording of watermarks. In *Puzzles in paper: Concepts in historical watermarks*, eds. D.W. Mosser et al. Delaware: Oak Knoll Press and The British Library. 187–192

Useful websites

The Dutch Institute for Art History – Florence www.iuoart.org
<http://www.abacus.bates.edu/faculty/wmarchive>
www.watermarks.info/indexi.htm

Suppliers

4-ply Rising Museum rag board
Conservation Resources
www.conservationresources.com.au
or
Zetta Florence
www.zettaflorence.com.au

CLE Lightsheet

CLE Design Limited
69–71 Haydons Road
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Tel: +44 20 8540 5772
Fax: +44 20 8543 4055
www.cledesign.co.uk

Author biography

Louise Bradley is a conservation framer and has been working in private practice in Melbourne since 1990, specializing in mounting and framing works on paper. From 1992 to 1994, under the Art Foundation of Victoria development programme, she assisted in the remounting of the print collection of the National Gallery of Victoria, including preparation for the 1994 Dürer exhibition. She is currently working as a conservation technician for the Centre for Cultural Materials Conservation, The University of Melbourne, on the remounting of the print and drawing collection of the Baillieu Library.

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