TAMMY JORDAN

Using Magnets as a Conservation Tool: A New Look at Tension Drying Damaged Vellum Documents

INTRODUCTION

It is the responsibility of the conservator to develop innovative treatment methods when existing methods may compromise the natural history of an object. In this light, how might magnets be used as a tool when objects have unique characteristics which prohibit current conservation treatment methods? Vellum documents in particular present challenges when they exhibit a variety of damage, planar distortion, adhered objects and media which require humidification and drying methods that allow the conservator the ability to manipulate the document itself while controlling external factors. This paper examines the treatment of a vellum document which necessitated alternatives to current methods for humidifying and tension drying while retaining elements of its unique natural history.

HISTORICAL BACKGROUND

The Society of the Cincinnati was established in 1783 to recognize officers of the Revolutionary War and their descendants. It served as an advocacy group for veterans of the war, ensuring that the federal government would honor pledges made to award pensions to war veterans (Hunemorder 2006). Each member was conferred with a certificate printed on vellum. In the year 1785 one such certificate was issued to Nathaniel Leonard.

The Excerpts of the Proceedings of the Order of the Society in the State of New Jersey (1908) states that Two affidavits were read in the Society respecting certain conduct of Captain Nathaniel Leonard, which were ordered to be filed.

> Resolved, that the Secretary be ordered to furnish Captain Leonard with a copy of said affidavits and cite him to appear at the next meeting of the Society on the 4th of July 1799 to answer. And that in the meantime Captain Leonard be suspended (1798).

Following the suspension of one year during the aforementioned meeting, it was

> Resolved that Captain Nathaniel Leonard be suspended from this Society until the 4th of July 1802 (1799).

In *The Genealogy of Some of the Descendants of John Webster of Ispwich, Mass. in 1635,* Lapham and Webster (1893) provide biographical information on the life of Nathaniel Leonard. They ascertain that Captain Leonard was suspended from Cincinnati membership in 1797, and provide no date of reinstatement following the seemingly temporary suspensions given in the excerpts above.

> . . . Capt. Nathaniel Leonard, Col. Dayton's Reg't N. J. Continental Line. He was commissioned Ensign Feb. 9, 1776, served through the war, and was discharged at its close, Nov. 8, 1783, and lived for some years at Rahway. Subsequently he abandoned his wife, was suspended from membership in the Cincinnati Society, 1797, and died according to his tombstone in Metuchen, N. J., May 1803, [at the age of] 50. With mind impaired through the conduct of her husband, Mrs. Leonard continued to reside in New York until her decease in Sept. 1834, [at the age of] 76.

DESCRIPTION AND GENERAL CONDITION

The Leonard membership certificate arrived at Etherington Conservation Services June 2010 under private ownership. It was severely cockled throughout; obsuring the printed and manuscript text. The brown manuscript ink was faded but otherwise legible. There was insect damage resulting in small losses and one larger 1 3/4" loss in the printed text in the upper third of the document (fig. 1). The certificate was free of any indication of mold activity such as stains or damage.

Presented at the Book and Paper Group Session, AIC's 39th Annual Meeting, May 31–June 3, 2011, Philadelphia, Pennsylvania.

Fig. 1. Membership certificate of the Society of the Cincinnati, 1785

Fig. 2. Membership certificate of the Society of the Cincinnati, 1785. Cut areas identified

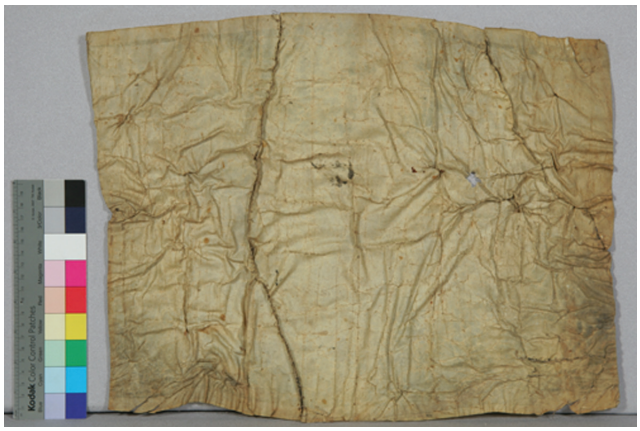

Fig. 3. Membership certificate of the Society of the Cincinnati, 1785. Reverse

There was no existing backing or adhesives contributing to the uneven thickness of the certificate.

The most notable characteristic is that there were two large apparently intentional cuts. One cut separated the entire right third of the document and the other separated a large upper left corner region of the document. There were also smaller cuts in the lower left corner that did not result in complete separation (figs. 2–3). The cuts were executed through the text indicating the damage transpired after the creation of the document. The cuts were oversewn with cotton thread to rejoin the separated areas and reconstruct the certificate as a whole.

The cockling of the certificate caused the separated edges to be misaligned. This caused the separated edges to overlap in some areas and gap in others. The cockling had also created tension on the repair threads. The threads themselves were very loose in some areas and taut in others. There were areas where the thread had frayed and become very fragile (fig. 4).

TREATMENT CONSIDERATIONS

When evaluating the treatment considerations for the Leonard certificate it was apparent that the nature of the damage and subsequent sewing would influence treatment decisions and challenge the author to be innovative.

Caple (2000) has concluded that the intentional mutilation of an object is a substantial part of its history. Caple prompted the questions; are the repairs stable? does their presence promote further deterioration of the certificate over all? should the separated areas be re-sewn with a stronger thread entirely, just in specific areas, or not at all? do the repairs represent an important aspect relating to the narrative of the

Fig. 4. Membership certificate of the Society of the Cincinnati, 1785. Detail, separated edge

object's existence? The damage that necessitated the existing repairs was found to be intentional due to the nature of the cuts themselves and, in part, to the documented history of the recipient. The cuts were therefore part of the physical history of the certificate, as were the repairs, and both required preservation. This assertion is supported by Portell's (2003) discussion of Smith's (2002) treatment of George Washington's will which also had sewn repairs.

> The recent treatment by Smith preserves many of the earlier repairs, such as the thread remnants of sewing mends that date from the Civil War and the fills of fine, well-matched, laid paper that Berwick added to the larger losses. The stitching holes and thread remnants are part of the document's history (364)

Portell suggests in her conclusion that it is prudent to stabilize prior repairs as opposed to altering them. Manitta (1991) recognized the different approaches of for-profit and non-profit conservators but that the underlying treatment ethics for both groups is the same. The owner of the certificate had requested that the text be made visible and that the certificate could be displayed when treatment was finalized. The delicate balance of addressing the client's needs and still retaining ethics in the treatment scheme did not pose a problem when stabilization of the sewing was seen as a viable option.

Humidification

Traditionally vellum was humidified by placing an entire document into a humidification chamber. Humidity was created in one of several ways: the document was suspended over water, a humidifier was added to the chamber with the document or a sandwich of damp and dry blotter and spun polyester Hollytex was applied directly to the entire document. The limp object was then transferred to a drying surface and clips were attached to the edges. The clips were secured with pins pushed into the drying surface. Tension was created or lessened where needed as the document dried by moving the pins in toward the document or out toward the edges of the drying surface (fig. 5). When the document was nearly dry, it could then be placed under press.

This method of humidification was viewed as problematic for the Leonard certificate because it would have required the ability to secure clips between the separated areas at the sewn edges. There was no way to secure clips in those areas without causing the sewing to stick while drying. Without the separated edges secured, as the certificate dried, there was a strong possibility that the sewing would be torn apart.

Another method that has been used is to humidify and flatten vellum on a vacuum table. The vellum is humidified in either one of three ways above or directly on the table. The vellum document is manipulated with the hands through a Gore-Tex barrier to flatten. Polyester film Mylar can be used to retain moisture in areas that have not been addressed to keep those areas from drying (S. Key, personal communication, 2010).

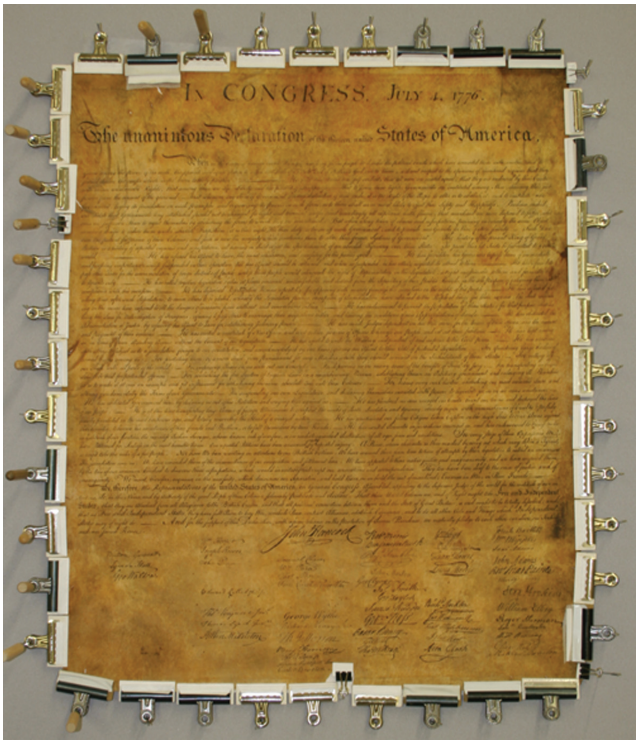

Fig. 5. Tension drying. Photograph by Etherington Conservation Services

Use of the vacuum table would have provided the flat support needed for the cut Leonard certificate. The drawback however was that the suction, even on the low setting, would have pulled on the looser sewing threads; particularly in the areas where there were gaps. The potential risk of damaging the sewing was seen as too high to attempt this method.

A third approach involved simply humidifying a vellum document in a humidity chamber and placed under press between spun polyester Hollytex and dry blotter. The blotter is changed out at frequent intervals while the document dries (M. Lee, personal communication, 2009).

This too was implausible for the treatment of the Leonard certificate because it would cause sticking of sewing thread to the humidified vellum and sticking of the overlapped areas to each other. It would be impossible to manipulate the gaps into realignment and to avoid weighting the thread against the humidified vellum edges.

A secondary concern of humidifying the vellum certificate in a humidity chamber is that the document needed to be transferred from the support in the chamber to a drying support. The movement of the separated sections of the limp,

humidified certificate had the potential to pull and break the thread without proper support.

The initial treatment proposal called for surface cleaning the certificate, humidifying it in a humidity chamber and flattening it in a gentle and controlled manner that would not damage the existing repairs (Clarkson, 1992). The certificate was then to be mounted and framed for intermittent display. When not displayed the framed certificate was to be stored in a custom-made clamshell box (Phibbs, 2003).

Rare Earth Magnets

Rare earth magnets are offered at Etherington Conservation Services (ECS) to conservators and technicians as a resource in their work with mends and fills. The author had several opportunities working at ECS over the course of two years to experiment with the use of rare earth magnets with works on paper.

In previous years conservators relied upon the use of rare earth magnets specifically for exhibition (Braun, 2002, Verberne-Khurshid, et. al., 2002). Spicer (2010) provides an excellent description of the characteristics of rare earth magnets and their applications in conservation. It was decided that the use of rare earth magnets would be attempted as a viable option for the process of tension drying the Leonard certificate.

Nickel-plated neodymium rare earth magnets with a pull-force of 1.63 lbs. were selected for the treatment. They were 11/16" diameter by 1/32" thickness. The rare earth magnets were wrapped in small squares of spun polyester Hollytex secured with painter's tape, which prevented them from abrading the surface of the certificate and provided an easy way to remove them once they had been placed. With experimentation, it was found that the thin width of the magnets allowed them to be placed relatively close together (within 1/4") without attracting to each other. Fifty rare earth magnets were purchased for use in treating the Leonard certificate measuring 17 1/2" by 14".

TREATMENT

It was initially determined that the certificate would be lightly surface cleaned and humidified. The cockling would then be relaxed to the extent that the document could be framed and read while displayed. It was understood that the optimum relative humidity in the lab during treatment of the certificate would remain between 55 to 65% during the treatment of the certificate. The final exhibit and storage environment of the certificate would either not fluctuate rapidly within a 15% range or the certificate would be enclosed in a way that mitigated external rapid fluctuation of relative humidity beyond a 15% range (Clarkson, 1987, Bark, 1993).

Trial 1

The certificate was surface cleaned by brushing between the cockling with a hake brush dry and very lightly moistened cotton on marks. It was then placed in a small humidification tray sandwiched between mesh screen, dry blotter and then dampened blotter on top and bottom. The tray was covered with a Plexiglas acrylic sheet. The certificate was left until about 80% humidified and limp. Despite concerns over the transfer from the humidity chamber to the drying surface, the certificate was transferred without damage to the vellum or sewn repairs. The movement required to do this posed a level of risk that prompted the author to question its suitability to the treatment.

The drying surface consisted of a thin metal tray large enough to accommodate expansion of the certificate as the cockling relaxed. The metal tray held a sheet of dry blotter and polyester film Mylar. The certificate was placed directly on the Mylar with spun polyester Hollytex and plastic sheeting placed over the top. The top covering was moved to expose the left edge of the certificate. The rare earth magnets were placed along the left edge and eased toward the right while lightly stretching and securing additional magnets. Where there were areas of sewing, the magnets were placed as close as possible to the sewing holes, without touching the thread on either side of the sewn edges. The areas not secured remained covered with the plastic sheeting. The placed magnets were manipulated to create and release tension where needed while new magnets were placed (figs. 6–8).

TREATMENT REVISIONS

From the initial work on the Leonard certificate, the decision was made to revise the treatment. The rapid drying time of unsecured areas, prompted the author to consider the importance of localized humidification (Quandt, 1996). The revised tension drying plan proposed using a sandwich of damp blotter and dry blotter (or Gore-Tex for water-soluble media) layered against the certificate in sections roughly in thirds (Singer, 1992). One section would be humidified in this manner, the blotter sandwich would be removed and the magnets placed before moving to the next section to humidify (table 1 and fig. 9).

During the tension drying phase of trial 1, the concentrated area of re-cockling also seemed significant. Figure 10 illustrates the direction and concentration of collagen fiber bundles in animal skin.

The direction and concentrated areas of cockling while the certificate was drying appeared to correlate with the spine and rear area located on the animal (fig. 11). These differences in directional run and concentration have the potential to vary profoundly throughout different regions of the vellum, and cause these areas to respond differently under the same conditions (Leather Conservation Centre, 1981). By manipulating

Fig. 6. Placement of rare earth magnets during tension drying, trial 1

Fig. 7. Placement of rare earth magnets during tension drying, trial 1

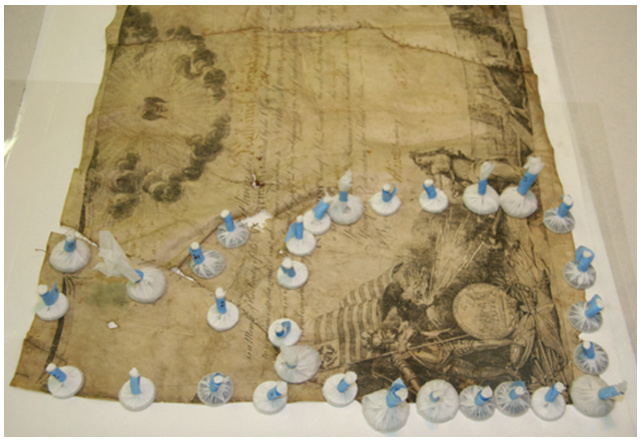

Fig. 8. Re-cockling as the certificate became dry in unsecured areas, trial 1. Detail area of concentrated re-cockling

polyester film	polyester film	polyester film
	damp blotter	
dry blotter	dry blotter or Gore-Tex	dry blotter
Hollytex	Hollytex	Hollytex
object	object	object
dry blotter	dry blotter or Gore-Tex	dry blotters
	damp blotter	
polyester film	polyester film	polyester film
dry blotter	dry blotter	dry blotter
metal tray	metal tray	metal tray

Table 1. Layering in metal tray. The middle third is layered for humidification

Fig. 9.

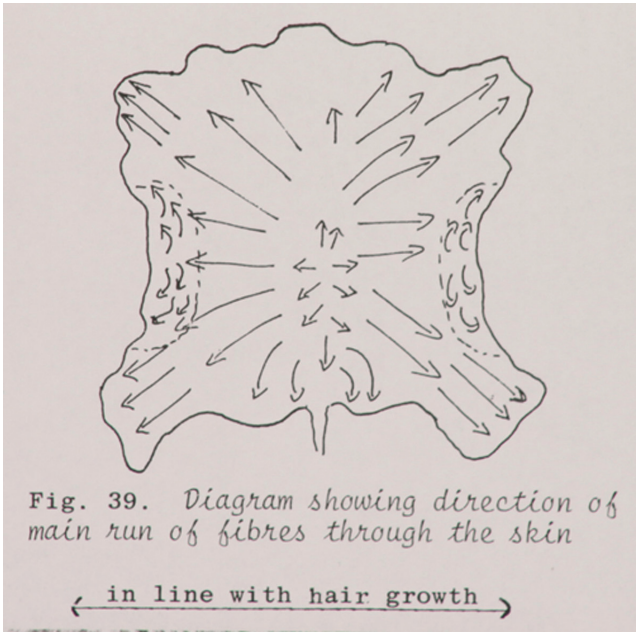

Fig. 10. Diagram by The Leather Conservation Centre (1981)

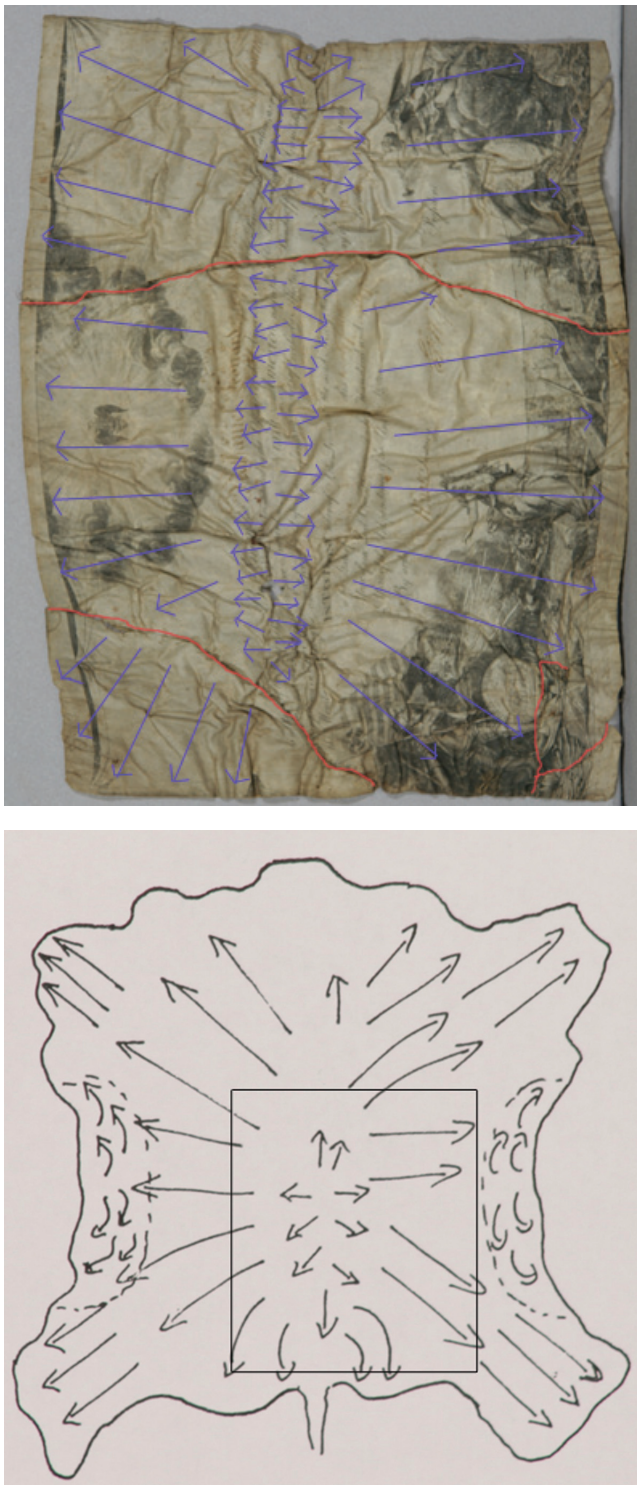

Fig. 11. Membership certificate of the Society of the Cincinnati. Comparison of area of re-cockling during drying and concentration of fiber bundles

the rare earth magnets it would be possible to address these differences by securing and moving the magnets in ways that would take the differences into account.

During Trial 1 the certificate had been considered as a unified whole because the separated pieces had been successfully sewn back together. Treating by beginning at the left of the certificate and working to the right seemed reasonable. With consideration of the variance of fiber direction and concentration of the sections separately, distinct characteristic for each separated section necessitated creating three separate points of reference (or starting points) for each section. The notion of now only considering the sections separately alone however, would also not work because treatment would need to begin from the center section of the entire document because when the cockling was being smoothed, the middle section would expand. If the left and right areas were humidified and secured first, the middle section would overlap them.

The author proposed that establishing reference points for both the entire certificate and the separated sections individually was essential for the success of the treatment.

Trial 2

In practice, the revisions offered more control both level of humidification and amount of tension created and released. By affording the ability to concentrate on smaller areas, differing characteristics of those smaller areas (such as change in thickness, misaligned edges and losses) could be addressed.

The Leonard certificate was locally humidified, beginning with the middle section. The covering of polyester film Mylar over the entire certificate decreased an abrupt change in humidity between areas not being locally humidified and those that were. Once the middle section was about 80% humidified (with the remaining sections being about 20% humidified), the blotters were removed from either side. The right section was then placed between the blotter sandwich. The rare earth magnets were placed on the middle section in the strip of concentrated fiber bundles. Because there were small losses in that area, magnets placed there, remained. The vellum was smoothed manually toward the top and bottom edges with magnets placed where needed. Magnets were also placed as near to the sewn edge as possible to protect the sewing from any potential movement.

The same process was repeated with the right section once it was humidified. Magnets were first placed near the sewn edge of the right section and then in the strip of concentrated fiber bundles. As these magnets were placed, the separated areas were realigned. Those magnets remained, again, as an anchor. Additional magnets were moved toward the top, bottom and right edge, and secured the vellum where it had been manually smoothed. During this time the middle section had been exposed and had dried about 80% without re-cockling. The magnets in that area were removed. Spun polyester Hollytex, fleece and Plexiglas was placed over the

middle section and weighted down. The remaining magnets were used to repeat the process on the left third section.

The left section was treated in the same manner, however there was no strip of concentrated fiber bundles in that area. The fiber direction was also much simpler in that it just channeled from the sewn edge to the left edge of the certificate. The magnets were placed near the sewn edge, the vellum was smoothed from there toward the left edge only, where it was secured. Figures 12–13 show the final placement of the magnets during the respective drying times for each section of the certificate.

FRAMING AND STORAGE

For the purposes of this paper, emphasis is placed on the conservation treatment of the Leonard certificate. The subsequent framing and storage conditions require attention because they influence the success of the conservation treatment over time. The initial treatment proposal included framing of the certificate for intermittent display and a custom clam-shell box in which to store the framed certficate (A. Bell, personal communication, 2010).

It is common practice at Etherington Conservation Services to provide a variation of the Chicago string mat for vellum documents when appropriate (Clarkson, 1987, Pickwoad, 1992, Glaser, et. al., 1993). It was decided that framing in a sealed, breathable micro-chamber would mitigate drastic fluctuations (more than 15%) in relative humidity when the certificate was back in the care of the client (Bark, 1993). A floating window mat was appropriate for the Leonard certificate because the decorative print on the certificate was somewhat close to the edges which were irregular.

Following humidification and relaxing the cockling of the Leonard certificate, the losses were filled with toned leafcast paper and a 3% solution of gelatin. In addition to the fills, reinforcements were applied to any gapped areas that remained between the cut, separated areas of the certificate. The reinforcements were strips of leafcast paper small enough to fit between the sewing threads. One inch lengths of undressed 25/3 bookbinder's thread were cut. Either end of each piece of thread was teased out with a scalpel to form a small fan. These were attached to the reverse edges of the certificate with a solidified 3% gelatin solution at approximately 2" intervals. Where there were irregularities, such as the edges of the large cuts, losses, or the area known to have a concentration of fiber bundles, the threads were placed closer together (Clarkson, 1987) (figs. 14–15).

A window mat was cut of 4-ply, 100% rag matboard, extending 3" on top and sides and 3 1/4" on the bottom from the edge of the certificate with allowance for 1/4" of space from the window to "float". A piece of cotton linen was cut large enough to extend at least 1" around the edges of the backing board and placed over the backing board. The window mat

Fig. 12. Final placement of the rare earth magnets (blue) on the certificate and over losses (green)

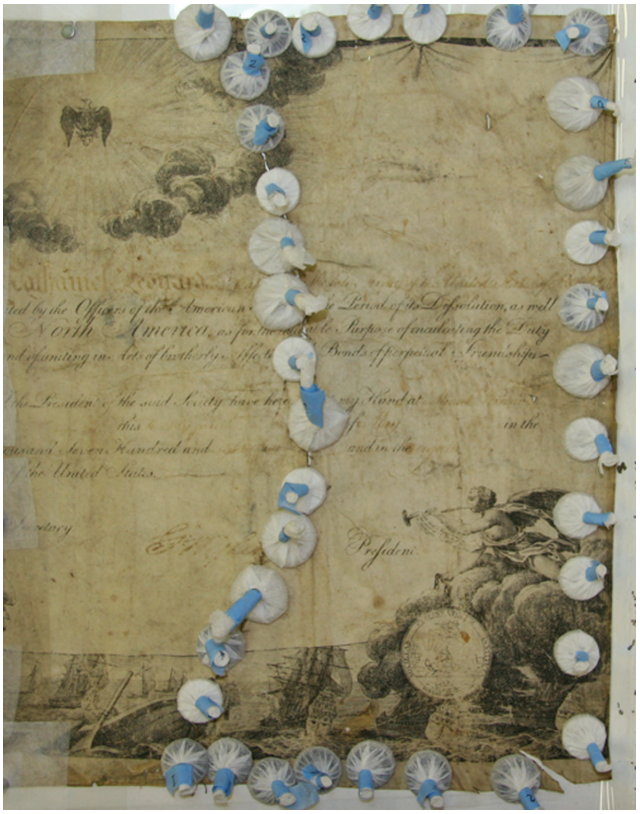

Fig. 13. Final drying. Membership certificate of the Society of the Cincinnati lightly secured with rare earth magnets

Fig. 14. Membership certificate of the Society of the Cincinnati prepared for string matting

Fig. 15. Reverse membership certificate of the Society of the Cincinnati. Tones and reinforcements

was placed on top of the linen. The certificate was placed on top of the linen and centered in the opening of the window mat with 1/4" of visible linen. Spun polyester Hollytex, fleece and Plexiglas were placed over the certificate with an inch of one edge of the certificate exposed. The window mat was removed and the linen was flipped over the certificate and weighted sandwich. The inch lengths of bookbinder's thread was pulled through the linen. The linen thread was lightly pulled away from the certificate, twisted once in the direction of the natural twist just before it kinks, and then affixed to the backing matboard with polyvinyl acetate (PVA) by pressing with a bonefolder.

The stronger adhesive (PVA) on the backing board versus the weaker gelatin on the certificate ensures release on the weaker end if cockling later ensues and causes the bond to break. Pickwoad (1992) suggested using wheat starch paste for the weaker adhesive, however Glaser (1993) found that wheat starch paste used for the weaker adhesive caused skinning of the vellum when torn away.

The bookbinder's thread on all edges were pulled through the linen and affixed in this manner. The weights and Plexiglas were removed and the cotton linen was adhered to the reverse of the backing matboard. MarvelSeal was affixed with double-sided tape to the linen covering the backing matboard on the reverse with a 1/4" margin at the edges. The matted certificate was glazed with UV-filtering glass with 1/8" spacers. Framer's tape was pressed onto the front 1/8" on the edge of the glass and wrapped around each edge to the back to overlap it over the MarvelSeal (Bark, 1993). The breathable, sealed microchamber was then dropped into a custom-made frame, secured and sealed with heavy framing paper.

DISCUSSION

The author found that the use of rare earth magnets an acceptable treatment alternative to current methods of humidifying and tension drying vellum documents. The method is particularly useful with severely cockled, damaged vellum. The implication of this work is that using rare earth magnets in this manner may also generalize to vellum documents with other unique characteristics, such as seals, permanent folds or major losses, which require the ability to secure specific areas.

Success of tension drying with rare earth magnets was found to increase when the fiber bundle direction and concentration throughout the document is understood. This finding raises the question as to whether or not examination of vellum documents under magnification and area mapping would be a beneficial practice during analysis and photo-documentation. This would
would provide a way to determine a point (or points) of reference, which in turn influences the treatment itself, in advance.

To establish the use of rare earth magnets as a reliable conservation tool for tension drying vellum, further investigation is necessary. Perhaps one area of possible study may examine incorporating the use of rare earth magnets in the conservation treatment of animal skins used for the costume of indigenous peoples. Another possibility is experimentation with various shapes of magnets. Flat, small magnetic strips occasionally used for framing may prove useful in securing a larger (1 1/2" to 2") surface area of vellum than individual magnets. Lastly, the long-term results of humidification and tension drying of vellum cannot be considered without attention to framing and storage. Continued inquiry into new materials for microchambers and study of varying microchambers to address the exclusive environmental needs of specific types of vellum would be extremely valuable.

ACKNOWLEDGEMENTS

The author would like to express her sincere gratitude to the following people: Michael Lee, Adrienne Bell, and

Don Etherington of Etherington Conservation Services; Elizabeth Frengel, Manager of Reader Services, Society of the Cincinnati; Deborah Hutchinson and Dr. Genie Umberger; and my husband Michael Fishman for his help and support.

REFERENCES

Bark, J. 1993. Conservation framing: Elements of conservation framing. *Picture Framing Magazine*, S24–S35.

Bell, A. 2010. Personal communication. Etherington Conservation Services. Browns Summit, North Carolina.

Braun, T. 2002. Using magnets as a temporary adhesive. *AIC Paintings Specialty Group, Postprints,* 15: 83–84.

Caple, C. 2000. *Conservation Skills: Judgement, Method and Decision Making.* London, New York : Routledge.

Clarkson, C. 1987. Preservation and display of single parchment leaves and fragments. In *Conservation of Library and Archive Materials and the Graphic Arts,* ed. G. Petherbridge. London : Butterworths. 201–209.

Glaser, M. T., Weintraub, S. & Marlatt, E. 1993. The Bill of Rights goes to Spain. *Book and Paper Group Annual,* 12. http://aic.standford.edu/sg/bgp/annual/v12/bp12-07.html (accessed 01/21/09).

Hunemorder, M. 2006. *Society of the Cincinnati: Conspiracy and Distrust in Early America.* http://books.google.com/books?id=Ywpr7Ed7UVwC&printsec=frontcover&dq=society+of+the+cincinnati+conspiracy&hl=en&ei=5VQJTvjrLITSsAPnk4icDw&sa=X&oi=book_result&ct=result &resnum=1&ved=0CCoQ6AEwAA#v=onepage&q&f=false (accessed 04/17/10).

Key, S. 2009. Personal communication. Etherington Conservation Services. Browns Summit, North Carolina.

Lapham, W. B. & Webster, J. O. 1893. *Some of the Descendants of John Webster of Ipswich, Mass. in* 1635. http://books.google.com/books?id=B85YAAAAMAAJ&printsec=frontcover&dq=some+of+the+descendants+of+john+webster+of+ipswich&hl=en&ei=6_6RTInLJM2gnQfA6NDqCA&sa=X&oi=book_result&resnum=1&ved=0CC0Q6AEwAA#v=onepage&q&f=false (accessed 04/17/10).

Leather Conservation Centre. 1981, August. *The Fibre Structure of Leather.* Northhampton, U. K. : Leather Conservation Centre.

Lee, M. 2010. Personal communication. Etherington Conservation Services. Browns Summit, North Carolina.

Mowry, J. F. 1994, Fall. Parchment: Its manufacture, history, treatment and conservation. *Guild of Bookworker's Journal,* 32 (2), 13–73.

Phibbs, H. 2003, April. Building a preservation frame. *Picture Framing Magazine,* (supp.) 2–28.

Pickwoad, N. 1992. Alternative methods of mounting parchment for framing and exhibition. In *The Paper Conservator: Vellum and Parchment,* ed. H. Shenton. London : ICON 78–85.

Portell, J. D. 2003. Prior repairs: When should they be preserved? *Journal of the American Institite for Conservation of Historic and Artistic Works ,* 42 (2). http://cool.conservation-us.org/jaic/articles/jaic42-02-010.html (accessed 09/08/2010).

Quandt, A. B. 1996. Recent developments in the conservation of parchment manuscripts. *Book and Paper Group Annual, AIC,* 15. http://cool.conservation-us.org/coolaic/sg/bpg/annualv15/bp15-14.html (accessed 01/23/2009).

Singer, H. 1992. The conservation of parchment objects using Gore-Tex laminates. In *The Paper Conservator: Vellum and Parchment,* ed. H. Shenton. London : ICON 40–45.

Society of the Cincinnati, New Jersey. 1908. Excerpts of the proceedings of the Society of the Cincinnati in the State of New Jersey from May 13 1783 to July 4th 1906. http://archive.org/stream/excerptsofprocee00soci#page/n7/mode/2up (accessed 04/23/2010).

Spicer, G. 2010, November. Defying gravity with magnetism. *AIC News,* 35 (6), 1–5.

Verberne-Khurshid, F., Smit, I. & Van der Sterren, N. 2002. The attraction of magnets as a conservation tool. *ICOM Committee for Conservation Preprints.* 13th Triennial Meeting, Rio de Janeiro. London : James & James. 1: 363–369.

SOURCES OF MATERIALS

K&J Magnetics, Inc.
www.kjmagnetics.com
by phone: 888-SHOP-KJM
or (215) 766-8055
fax: (215) 766-8054

TAMMY JORDAN
Assistant Paper Conservator
Etherington Conservation Services
Browns Summit, North Carolina
tamaralynnjordan@yahoo.com
tammy_fishman@nps.gov