MARIAN PECK DIRDA & LESLIE HILL PAISLEY, MODERATORS

Stain Reduction Discussion

This group met to share their experiences and philosophies of stain removal. The discussion covered and emphasized pre-bleaching techniques including washing procedures, solvent treatments, use of enzymes, and stain reduction with pH- and temperature-adjusted washing.

The discussions began with introductions by the moderators. Leslie Paisley described her apprenticeship training and twenty-year practice, which focuses primarily on fine art in a regional lab setting and which occasionally presents works on paper in desperate shape. She mentioned the difficulty of looking up old treatments to judge long-term affects of her treatments. She quoted the *Paper Conservation Catalog* (1994) that bleaching is considered a last resort and added that the general consensus among those she has spoken with seems to be that conservators have the greatest faith in the long term effects of natural light bleaching. Chemical bleaching is considered cosmetic to the point that some conservators are ready to use thirty or more hours of sun versus a five- to fifteen-minute exposure to weak chemical bleach. There doesn't seem to be a clear answer to which is more destructive. She emphasized that she never uses a bleach that she can't wash out and avoids all local treatment, even local water or alcohol, due to the uneven aging she has seen on previously treated artwork. It remains difficult to even out these secondary stains when the previous treatment records are sketchy. She has become more conservative and educates clients that not all treatments that *can* be done *should* be done. She repeated a comment made earlier in the day about the necessity to educate curators to what "white" is.

This open discussion took place on June 2, 2001, during the AIC 29th Annual Meeting, May 30–June 5, 2001, Dallas, Texas. The moderators organized and led the discussion and recorded notes. Readers are reminded that the moderators do not necessarily endorse all the comments recorded and that although every effort was made to record proceedings accurately, further evaluation or research is advised before putting treatment observations into practice.

Marian described her successful work with organic solvents, which includes the use of ultraviolet (UV) light during all stages of removal, and the use of flushing solvents over suction to keep the strong solvents out of the areas of good paper. She is often forced to work locally but by confining treatment to the area of stain which would have aged unevenly anyway she can avoid dye rings and more invasive treatment.

SYNOPSIS OF DISCUSSION

Bleaching was generally considered a last resort and is less and less routinely used. Bleaches discussed included light (natural and artificial), light with small amounts of hydrogen peroxide added, chlorine dioxide, chloramine T, hydrogen peroxide, sodium borohydride, and sodium bisulfate. The local use of the reducing agent sodium dithionite on iron-containing spots was presented.

PHILOSOPHICAL THEMES

A major theme was a holistic approach to maintain a unified aging of the paper over time versus localized treatment that can be accomplished without "treating" the entire object. There was call for conservators to envisage how treatments and paper might age. We are already seeing negative effects of localized/overall treatments ten to thirty years old that could not have left the hands of the conservator in their present condition. There was a call for conservators to revisit treatments and treatment reports in order to critique their own practices. There was an interesting suggestion by one conservator in private practice who sends clients a postcard ten years later offering a free evaluation. This gives her a chance to review aged treatments.

The lack of sufficient washing after bleaching (even when sun bleaching follows washing) emerged as the major culprit in reversion of color. The cases discussed were light, hydrogen peroxide, and chlorine dioxide. One

contributor offered that gas phase treatments done in Germany thirty years ago that were not washed are now very discolored. Bad rinsing produces bad outcome.

SPECIFICS OF THE DISCUSSION

Solvents

There is an increased awareness now of invisible optical brighteners, dyes, and bluing used in papers, which might be washed out or altered by solvents. Conservators need to examine and test in UV light before, during, and after treatment. Water is a strong solvent. Surface adhesives are much more effectively and safely swelled with vapor treatments than by direct application of solvents. If local water application is used even for hinge removal, it can show up later with uneven aging of paper. One conservator reported that to prevent tideline staining from organic solvents, she has good luck washing the paper first to remove discoloration followed by solvent work and then more washing. Comparisons of the suction power of various equipment and barrier solvents for control of stain movement were touched on.

Poultices

Fuller's earth and ash-free filter pulp—made by Whatman and available from Fisher Scientific—are used, but with varied success by most conservators. They work better when used with aqueous poultices. One conservator uses the poultice fairly dry and sprays it on mat burn and tidelines. Refer to Debora Mayer's tip (1994). There was a discussion of the capillary properties of various poultices and the degree of wetness.

Sodium Dithionate (hydrosulfite)

Used by one conservator at 3% locally on suction table, it solubilizes and decolorizes iron and allows iron and stain to be rinsed out. Here local treatment is necessary, as the object cannot be immersed. This stimulated more discussion of local versus overall treatment.

Stain Reduction with No Bleach

There was much discussion of various tips to remove extreme stains without bleaching. One successful treatment when all else failed on very brown tidelines was the use of steam locally on the suction table. Another conservator reported having luck directing the movement of stains with controlled evaporation: evaporation is prevented on the upper surface with airflow beneath, forcing accelerated drying from the reverse to move stains to verso. Another conservator reported using dimethylformamide mixed with ammonium hydroxide to remove green felt tip pen. This was the only thing that worked.

Revisiting older bleaches

Some older bleaches have advantages, and we need to review the literature again before we revive them in our own practice. Experienced conservators agreed that chloramine T did produce wonderful results but are uncomfortable with it due to its inability to be washed out completely. Older European conservators are still using it, but younger ones are avoiding it. Chloramine T also produces dioxin.

The use of chorine dioxide at 0.2% is slow and controllable. In aqueous form it is very effective for wood-slat and knot-hole stains; it tends to selectively decolorize the most acidic and darkest stains because it works in an acidic condition. Don't pre-treat with alkaline washing. This treatment is only completely safe on most black and white nineteenth- and twentieth-century prints. It has been used cautiously with brush applications on very tolerant colored printing inks. You must wash out and use antichlor. One element of the solution (formalin) is toxic. Use caution to prevent generation of a gas cloud. You must have good ventilation if using indoors. The treatment won't work if the solution gets too cold in fume hood. You must use the solution in the range 70–80°F.

Other Bleaches

Reducing bleaches such as sodium bisulfite are still being investigated. The field is interested in finding more alternatives to decolorizing stains in oxidized papers. Alternative reducing agents are safer for the environment, the object, and us. Remember, the reaction is actually good for cellulose with lower pH in the working solution than sodium borohydride.

Hydrogen peroxide is much used, both locally and through spray applications. The discussion group reinforced the need to wash out solubilized products and the bleach residues for quite a long time after bleaching. Reversion occurs only with items not washed thoroughly (for at least two to three hours). If the artwork cannot take sufficient water washing, one conservator suggested you can wash out also with ethanol, but there is no excuse for not rinsing.

Light bleaching (both natural and with light banks) seems widely used but not much discussed.

Use of enzymes for oil stains was brought up. Low boiling point solvents like butyl Cellosolve (ethylene glycol monobutyl ether) are still better. Participants were referred to an article by Agnes Blüher, Anika Grube, Uwe Bornscheuer, and Gerhard Banik (1997).

The session concluded with a discussion of how to remove feces and urine contamination from paper. No specific success stories were relayed, but if the stain is still wet, a conservator suggested using dry poultice (such as baking soda) to absorb immediately.

REFERENCES

Participants were referred to the Book and Paper Group *Paper Conservation Catalog* Chapter 19 for philosophy statements, details of various bleach solutions, appropriate selection with caveats, and a bibliography. Also much excellent work was published on bleaching in the *Paper Conservator,* in the conference papers from the Institute of Paper Conservation conference in Manchester 1992, and in the *Journal of the American Institute for Conservation* in the 1990s.

Bleaching. 1994. Helen D. Burgess, Dianne van der Reyden, and Keiko Keyes, compilers. In *Paper Conservation Catalog,* 9th ed., chapter 19. Washington, DC: AIC Book and Paper Group.

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