Article: The Daguerreotype's Environment
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Topics in Photographic Preservation, Volume 1.
Pages: 16-22
Compiler: Maria S. Holden

Topics in Photographic Preservation is published biannually by the Photographic Materials Group (PMG) of the American Institute for Conservation of Historic & Artistic Works (AIC). A membership benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is primarily comprised of papers presented at PMG meetings and is intended to inform and educate conservation-related disciplines.

THE DAGUERREOTYPE'S ENVIRONMENT

Presented by
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at the

AMERICAN INSTITUTE FOR CONSERVATION
Photographic Materials Group
Charleston, South Carolina
March 21-22, 1986

The importance of a properly controlled and conditioned environment is always and rightfully stressed in the literature on the preservation of photographic images. The maintenance of a properly designed H.V.A.C. system with particulate and gaseous air filtration, is considered the most effective and cost efficient method of stretching any institution's preservation monies.

With all sensitive, highly reactive silver photographic images, the absolute need for controlling atmospheric pollutants is now recognized. Sulfur dioxide and hydrogen sulfides, peroxides, nitrous oxides, ozone and other oxidizing agents are especially problematical. As more and more of our photographic heritage gravitates towards collections in large urban areas, the monitoring and correction of harmful air pollutants becomes increasingly important.

In my talk this afternoon I want to discuss the environmental conditions prevalent within the traditional American Cased Daguerreotype. I will look closely at some of the materials which make up these cases. The "Daguerriean Environment" so to speak. I will also be discussing at some length a material which might have a very practical application in the conservation of these early images.

As you all know, **[SLIDE OF BEARDED MAN IN CASE]** American daguerreian images were usually carried away from the photographer's studio protected and enhanced by the miniature cases with which we are all familiar. The 'craft' of matting, glazing, sealing, and encasing the daguerreotype image was an effective means of preserving it from physical, chemical and biological deterioration processes. It not only served its purpose admirably well, but it also afforded a handsome, intimate object--a tactile, optical delight to hold and behold.

The components of the average American-made daguerreotype include no less than five major elements. These are: Wood, Leather (usually dyed, tooled and/or gilded), Metals (silver, mercury, gold, copper, brass), Glass, and Textiles (satin, silk, and velvets cotton & wool). Secondary elements which have the greatest importance for the preservation of the actual image bearing plate include paper, and animal adhesives, the predominant components of the typical binding or sealing tapes.

One of the most important components of the traditional packaging system is the daguerreotype's cover-glass. **[SLIDE OF DETERIORATED COVERGLASS]** Thanks are due here to one of our colleagues for her distinguished work along these lines. Dr. Barger has added much to our understanding of just how the deterioration of 19th century cover-glass can affect not only the visual appreciation **[SLIDE OF DETERIORATED COVERGLASS OVER IMAGE]** of the daguerreotype image but also the condition of the image-bearing plate itself. It is not my intention here to re-iterate what Susan has said through her publications and lectures on the deterioration of daguerreian cover-glasses. I would enthusiastically refer those interested to her publications.

In my effort to determine if other components of the 'daguerreian environment' might not be contributing to image deterioration, I ran a series of tests on various elements of daguerreotype case materials. Covering leather, velvet & satin pad fibers, and binding tapes were studied. The test used was one for tarnish potential and is described in the I.I.C.'s "Studies in Conservation" Vol 27, Number 2, 1982, in an article by Daniels and Ward. The abstract states: **[SLIDE OF ARTICLE'S ILLUSTRATION]**

> A sodium azide based solution decomposes when in contact with materials which have the *potential to tarnish silver by evolution of hydrogen sulfide* The rate of evolution of nitrogen gas from the reagent has been used to assess the severity of the tarnishing. The test is microchemical and takes only a few minutes to perform.

As the following slides will show, in the samples I tested the amount of sulfides present in the textile pads and inner coils, (pressed for perpetuity into initmate contact with the daguerrean cover-glass), was consistently rated as "Serious" in Ward and Daniels' Three-Level system. **[SLIDE OF WOOL IN REAGENT/SLIDE OF SATIN IN REAGENT]** The sample from the case's leather covering also exhibited severe potential for tarnishing when reacted with the sodium azide. **[SLIDE OF LEATHER IN REAGENT]**

[SLIDE OF DRIED BINDING TAPES] As any protenaceous, organic substance will have its share of sulfur molecules, it came as no suprise that the amounts of sulfide-indicating nitrogen bubbles generated by the original paper & adhesive sealing tapes were very high. Here are some original tapes in the sodium azide reagent. **[SLIDES OF PAPER TAPES FOAMING IN REAGENT]** The same test was conducted on other elements of the daguerrean package. Samples from paper mats, and backing papers were also tested. **[SLIDE OF PAPER MATTED 1/4 PLATE] [SLIDE OF SAMPLE IN REAGENT]**

PermaLife Bond (the binding-tape 'paper recommended in Alice Swan's article on the daguerreotype in 1978) **[SLIDE OF DRY PAPER ONLY]** and a twenty mil (single-ply) board from Andrews/Nelson /Whitehead both tested out as negligeable in the reagent. **[SLIDE OF THE LIBRARY BOARD]** Therefore these papers may be used safely even within the daguerreotype package if absolutely necessary. Unfortunately, the samples I tested of PermaLife Bond with a dried polyvinylacetate adhesive upon it (Jade 403) showed signs of generating a very slight degree of sulfide indicating gas. Although they would be rated as negligable in the Daniels and Ward system,

they still point to the need for a more suitable adhesive to be used in daguerreotype binding.

The implications of these results are, I believe, worth considering. **[SLIDE OF EARLY DAGUERREOTYPE]** Given that the traditional case's leather, decorative textile padding and inner coil of fabric, binding tapes/adhesives, **ALL** exhibited the potential to generate sulfides and possibly cause tarnish formation, our daguerreotypes seem predestined to deteriorate in large part due to the very nature of the materials designed to protect and enhance them. With the tendency for original binding systems to embrittle, and ultimately loose their effectiveness as atmospheric barriers, and with the current levels of atmospheric contaminants in our exterior and interior environments, there is cause for concern. ¿Is this situation remedial if potentially detrimental materials are an inseparable part of the composite object, which the cased american daguerreotype most certainly is? ¿What should the standards be for the selection of a suitable binding paper and adhesive system? ¿What materials are available to protect these silver-rich images from their predeliction to tarnish and oxidize?

In the mid 1970's Mr. Robert Wieman of the 3M company developed a product called Oxidation Arrest Paper. **[SLIDE OF PRODUCT LITERATURE]** This paper was originally designed for the electrical-component industry to keep their silver surfaces free from oxidation and tarnishing reactions during long storage periods. The technical data provided by the 3M company seemed clearly to indicate its effectiveness, both in controlled experiments and in field tests. In a paper presented to the American Defence Preparedness Association in October of 1982, Wieman stated:

> Protection time depends on the nature and permeability of the storage container, and on the pollution level of the surrounding atmosphere. For 'normal' atmospheres, one 2" x 7" strip of Oxidation Arrest Paper in a container of 422 cubic inches (7 1/2" per side) will provide the following protection: (to product failure)
>
> Loosely sealed container (cardboard box.....6mo.)
> Moderately tight seal (lightweight Poly...12mo.)
> Tight seal (low permeability.....24mo.)

Assuming that the daguerreotype case is considered as tightly (or loosely) sealed as a cardboard box--and that its volume, with a 1/6 plate in place, is less than one cu.in., then according to 3M's test results less than one square inch of Oxidation Arrest Paper would be needed to effectively absorb all ambient sulfides within the case construction, for a period of six months. One may easily exceed this amount of surface area, and thereby presumeably the length of effectiveness, by including a square cut to the size of the recessed bed, beneath the daguerreotype plate. **[SLIDE OF SUCH]** Another same-size sheet could be easily placed between the textile pad and the cover glass. **[SLIDE OF SUCH]**

Estimating two 2 x 3" sheets of Oxidation Arrest Paper within each cased image; the effective length of time to failure (i.e. no longer absorbing ambient sulfides) should be on the order of **at least** 2-3 years. One of the observations recorded by Mr. Wieman after his tests was that "the days to failure for the test components were approximately 10x the days to failure for the control components."

In trying to find a method of determining when the "Arrest Paper" might be nearing its absorbtion capacity, I spoke with Dr. Sinclair, a chemist at 3M with an interest in photographic conservation, about the possibility of producing the paper with some type of indicating coloration. This of course, would be very useful to curators, collectors, and conservators who would need to know when to change the paper in order to provide maximum protection. By taking advantage of the oxidation process by which the absorbed sulfides are converted into acids in the presence of moisture, the product itself might be made to act as a litmus paper. As its acidity increases, the color change would be indicated visually and a 'fresh' piece of 'arrest paper' could be furnished as needed. Ideally perhaps this paper could be produced to specifications of permanent/durability and then be used with a suitable adhesive as binding tapes, but its natural tendency towards increased acidity over time would preclude this use.

The product may even have wider applicability in the storage of large photographic collections. Used as a lining in storage and exhibition cases, solander boxes and file cabinets, progress in reducing the effects of detrimental environments seems possible. For example, a full sheet of this paper, placed as a barrier between a backing, and a dust-seal within a

framed photograph might be very effective. Laying a strip of this paper over a cracked cover-glass until reglazing and resealing can be undertaken should reduce the likelihood of tarnishing directly beneath the cracked glass.

Field tests seem to have proven the effectiveness of this "Oxidation Arrest Paper." In the mid 1970's, the Boston Museum of Fine Arts was selected as a cite for such a field-test. Their Department of European Decorative Arts placed swatches of the arrest paper within an acrylic case which held a silver tureen from the 17th century. Apparently curators there felt that the absorbing paper was effective in controlling tarnish formation.

Mr. Roy Perkinson, paper conservator at the M.F.A., was unfamiliar with the "Arrest Paper." When I explained it properties, he immediately raised many of the same questions which I had initially. ¿Would the paper desorb? ¿Was there a way to indicate saturation? He asked a colleague at the M.F.A. about this product and found that it is still in use by the Department of European Decorative Arts today. In fact it has been used in direct contact with some large silver objects. To date no alteration in surface characteristics has been noted!!!! To his knowledge no other application of the paper has been attempted in any other department.

Dr. Sinclair informed me that the patent which 3M holds on the product is NOT for its active ingredient (activated charcol) but rather for the process of impregnating the paper during its production. By this patented method, the chances of activated, sulfide laden particles shaking loose from their "moorings" in the paper carrier, are dramatically reduced. The field tests at the M.F.A. seem to bear this out.

At this time however I hesitate to endorse the use of this paper in photographic applications of any kind. Until further tests are designed and conducted, both with daguerreotypes and other photographic images, I must desist from wholeheartedly endorsing what promises to be a very useful material. Further testing will I hope be forthcoming in the near future.

[SLIDE OF DOUBLE ANNIVERSARY PORTRAIT DAGUERREOTYPE]
The importance of reducing or eliminating atmospheric contaminants is paramount in daguerreotype preservation efforts. Proper sealing with the best possible adhesive/tape systems will greatly reduce the potential for

tarnishing to occur. The inclusion of a sulfide absorbing paper within the case may also lower the risk of oxidation reactions on these silver-rich images. The interaction of the various and diverse elements within and without the traditional daguerreian package, the "Daguerreotype's Environment," so to speak, must be studied if we as conservators, charged with the responsiblitity for the preservation of these our earliest images, are to successfully achieve our ends.

If any of you are seriously interested in testing this Oxidation Arrest Paper, whether in the laboratory or in a specific experimental design with daguerreotype images, please feel free to contact me. I believe that the A.I.C. Directory has my correct address and telephone numbers and I sincerely welcome any comments or ideas any of you might have. Thank you for your time and attention this afternoon. And now if there are any questions, I will be happy to try and answer them.

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