CONSERVATION ISSUES OF PAPER STEREO TRANSPARENCIES

Elena Simonova-Bulat
Andrew W. Mellon Fellow
Advanced Residency Program in Photograph Conservation
Rochester, NY

TABLE OF CONTENTS

PREFACE

I spent fifteen years at the State Russian museum in Saint Petersburg (Russia) as a paper conservator. The State Russian museum is the biggest museum of Russian fine art. The museum today is located in four beautiful palaces in the middle of St. Petersburg: Michailovsky Palace (main building), Marble Palace, Stroganov Palace and Michailovski Castle. The collection of this museum is very unique. It represents different art objects from the 10th century until today. One of the most captivating portions of the museum collection is a collection of fine art objects on paper support.

This museum has a very rich history. It was established as a museum of Alexander the 3nd 105 years ago. It went through the Revolution, World War 2, and the Blockade. Most of the great collections survived, strangely enough. However, the result of all of the disasters during the Revolution and War was a high percentage of damaged objects, especially those on paper support because these are the most delicate part of the collection. The climate in St. Petersburg is very cold and humid, and this creates a high risk for paper object deterioration, especially if there is no climate control. It was very difficult for this collection to survive during the Blockade, when the whole city was out of the electricity during a few humid winter months. During the105 years of its existence, the collection of the State Russian museum was regularly augmented with material acquired from private collections, which had faced the same difficulties during the war period. This situation is explains why the paper collection in the museum needs to receive consistent care and attention by a conservator.

The most unique and rare part of this collection is from end of the19th and beginning of the 20th century period. Many famous artists were working at this time in Russia, especially in St.Petersburg. The Russian Avant-garde was born in St.Petersburg. There was an other very famous artists group known as “World of Art”, which included the most progressive artists of that time. It was the peak period of developing an absolutely new and unique aesthetic and philosophy in Russia. Literature, music, theatre, imaging art, cinematography of this period have an incomparable quality. It was quite simply, a Russian Renaissance.

There was a very close relationship between art and the theatre. Russian theatre was famous around the world in the last part of the 19 century (system of Stanislavsky). The theatre had a very big influence on the art of this period. Many artists were working in a decorative, theatrical style. It was a time of beautiful dreams and illusions. Maybe this was the real, underlying cause of the Social Revolution? Who knows?

I spent many unforgettable years as a conservator in this museum. I was involved in a very mysterious world of illusion. When I extended my professional interests to photography, I was looking for the same magical experience. There is a great magic in photography itself. I started to learn about photography. I found it incredibly interesting and mysterious also. It has a different aesthetic, a different meaning but the same purpose as other types of art-that is to came closer to reality, but still keep the shadow of illusion and dream.

I found that the paper photograph collection in the museum had the same problems resulting from the historical events in St.Petersburg.

After few years of struggling with the history and science of photo conservation I was accepted as a Mellon Fellow at the Advanced Residency Program in Photograph Conservation in George Eastman House. At the time of making a decision about my final research project I realized that I was looking for that kind of project where I could combine my experience in paper conservation with my interest in photo conservation. My first choice was hand colored photographs .They are common, and they are becoming more so today. They definitely have many problems and my paper conservation background would be very helpful in this kind of project.

I started my survey of the GEH collection. It is a very broad collection, in which many different types of hand colored photographs are represented.. From the beginning I understood that I should limit myself to just hand colored photographs on paper support. But there were still very wide variety of these objects, all with different problems. During the survey my focus narrowed dramatically. I decided to concentrate on hand colored albumen prints only. But it still was not exactly what I was looking for. The aesthetic of hand colored photographs, generally speaking, is very different. This combination of an image, received through the camera and painting in different techniques has something very artificial, strange looking beauty. A hand colored photographs have a very different aesthetic, created in time, which can result in a faded photographic image, coupled with impact bright and colorful painting, especially noticeable when the painting is of great quality. It is no longer more a painting, but it is not quite photography either. It actually is more interesting and acceptable when the painting has grotesque qualities and more dramatic meaning. I was looking for drama.

A few years ago I treated a broken megalethoscope slide. It was a very interesting, and challenging experience. A complex combination which includes the albumen print with watercolor painting on the back, some watercolor drawing, a piece of tissue paper with wax inside and a fabric back was broken on two parts with completely ruined the original effect of the object. Actually it was not a conservation treatment but a complete reconstruction. It was drama. The mysterious effect of changing the light brought color and movement in to the image. I was looking for something just like that. But Megalethoscope slides are very rare.

Grant Romer then called my attention to the large number of other (unfamiliar to me) albumen transparencies, known as “French Tissues”.

I found them charming with beautiful effects, related to the theatre and history of the cinema, in a great variety. They have deterioration problems which are very typical of all paper transparencies and hand colored photographs. They require a blending of photograph conservation and paper conservation. They have drama and a theatrical aesthetic.

Introduction

Paper stereo transparencies were very popular entertainment in the middle of the nineteenth century. Typically, cards were sold in sets of 12, and could cost the equivalent of three to ten days' salary for the average person in Paris. Special optical devices were required to properly view PSTs, and these viewers were also expensive.

Today French tissues are very valuable as cultural artifacts from nineteenth-century France, as the predecessors to television and radio as family entertainment.

In the early years the stereographs were not commercially produced. As the result of this the most beautiful stereo transparencies are the earlier French tissues. The production process was a careful crafting of beautiful, rare novelty objects. After 1857, stereo transparencies were made commercially, but still the quality was very high. The best tissues were made in France from the 1860s through the beginning of the 1870s. They were manufactured by hand, with much care. Most early PSTs have survived in good condition. However, tissues are inherently fragile; therefore, many of them are suffering from some form of physical damage. Towards the end of the1870s the quality of the tissues declined. The manufacture changed considerably; the main goal became to make them faster and more cheaply. This has resulted in later tissues being very yellow and faded.

PHILOSOPHY

An awareness of the conservation issues of PSTs is very important to develop an historical understanding of these objects from a conservator's point of view.

The object's complex structure, unique meaning, and original intent are three factors to be considered when making decisions about the level of conservation intervention. What should be given priority in the treatment of French tissues: the albumen print, the watercolor painting, or the physical structure of the object? Is it more important to preserve the object itself, or is it advisable to preserve the intent of the object? How can we best preserve the overall impact of paper stereo transparencies?

THE CONSERVATION ISSUES

French tissues need different degrees of treatment intervention. They have a wide variety of problems: physical, chemical, and biological. A survey of the George Eastman House collection showed that almost 70% of the collection (506 objects) needs some conservation intervention for their physical stability. The structure of French tissues is very complex: an albumen print with watercolor painting or aniline dyes and a tissue paper (sometimes light-weight paper) with or without painting. This two-layer sandwich is between two cut-out window mat frames. As they were actively used, they are often found with tears and losses, the result of physical stress. They may also be faded, yellowed, or foxed as the result of exposure to light and environmental conditions. All types of deterioration dramatically minimize their intended effect.

Because of their intrinsic value, their deterioration, and their complex structure it is important that PSTs be properly researched and that appropriate conservation principals be developed. Virtually no conservation references to treatment of these objects exists, and attempts at treatment by "amateurs" have frequently created even more conservation problems. For these reasons a serious study by a professional conservator is critical to the long-term preservation of paper stereo transparencies. This is the goal of the research project to be discussed.

PROJECT OBJECTIVE AND PLAN

OBJECTIVES

- To clarify (document) the typical problems of PSTs

- To conduct case-study interventions as a guide to others
- To identify the appropriate philosophy for the conservation of PSTs and establish some recommendations for use, display, and storage.
- To better synthesize skill sets and establish a model for others faced with similar problems requiring a blend of specialties.

PLAN

Study History of PSTs

- Literature
- Collectors/historians

Most historical information is the result of collaboration with collectors and historians. It is clear that most PST collections are in private hands.

Gather Specimens for Study and Treatment

Issues regarding the conservation of Paper Stereo Transparencies (PST's) will be discussed using example from the collections of the George Eastman House, Tex Treadwell, Denis Pellerin, Pierre Tavlitsky and Elena Simonova-Boulat (the author). Ten objects with different types and stages of deterioration were chosen for case studies.

Conduct Treatments

1. Surface cleaning
2. Disassembly
3. Tape removal
4. Mending without disassembly
5. Washing and bleaching
6. Mending of albumen prints
7. Lining of albumen prints (addition of secondary support)
8. Mending and lining of tissue papers.
9. Treatments of cut-out window mat
10. Retouching
11. Reassembling PST's after previous treatments

Light Stability Test

The accelerated light-fading test was conducted in conjunction with the Image Permanence Institute. This test was conducted on an original PST from the study collection.

In order to better understand the effects of light on French tissues, especially considering the exhibition environment where samples may be displayed for as short as just a few weeks or as long as over a year, an accelerated light test was conducted on a French tissue sample (already deteriorated), using cool white fluorescent light (7 kilolux) for a period of 60 days, at 70°F ±5°F and 50% RH ±5%. The sample was glass-protected in order to remove a portion of the UV radiation (the most damaging portion of the spectrum) and to more closely simulate the exhibition and viewing environment of the French tissues (understanding that the actual conditions may greatly vary depending on institutional specifications and other factors).

A Short History of French Tissue Stereo Transparencies

INTRODUCTION

The first fifty years of photography (1840-1890) were a time of great creative experimentation, innovation, and crossover influences between art, science, and the new form of imaging. Many of these were significant steps contributing to the evolution of today's vast visual entertainment industry. Among the most important of these is the French tissue stereograph.

Strangely neglected by historians of photography, cinema, and the theatre, despite the marvelous nature of the first forms of photography, the images lacked many of basic elements experienced by the human eye in seeing. Objects were monochrome, two-dimensional, and static. Many pre-existing forms of optical novelties, blending art and science in rendering astonishing illusions, had established the commercial business of providing "virtual reality" shows.

Fig.1 Shadow figures

The popular theatre, the panorama, and the diorama provided public experiences in the 1820s and 1830s, which set the stage for photography to play upon.

Different styles of optical novelties appeared throughout history. A short list of these toys might include:

- 16th century — Illusionistic stage sets based upon linear perspective.
- 17th century — Perspective boxes and early peepshows.
- 18th century — Robert Barker, large-scale panorama.
- 19th century — Daguerre's diorama, large-scale illusionistic transition picture show.
- 1839 — Photographic inventions announced to world.
- 1851 — Photographic stereography invented.

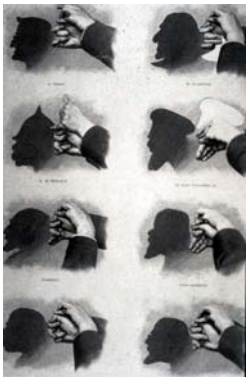


Fig.2 Shadow figures

Fig.3 Shadow figures

Fig.4 18th century optic views

Fig.5 Polyrama Panoptique

Fig.6 Shadow theatre

Fig.7 Shadow theatre(transmitted light)

Fig.8 Paper theatre

Fig.9 Paper theatre

Fig.10 Stage set Perspective

Fig.11 Stage set Perspective

Fig.12 Peep show

Fig.13 Peep show box

Fig.14 Peep show viewer

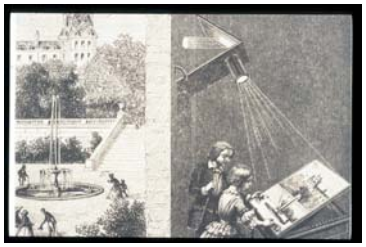


Fig.16 Camera Obscurae

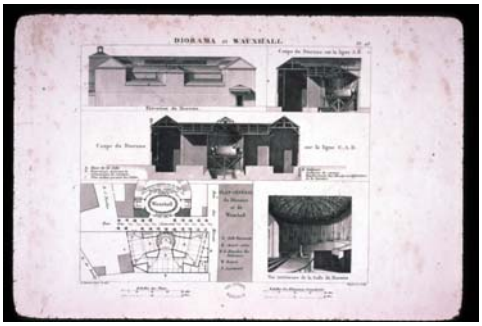


Fig.17 Diorama, Paris

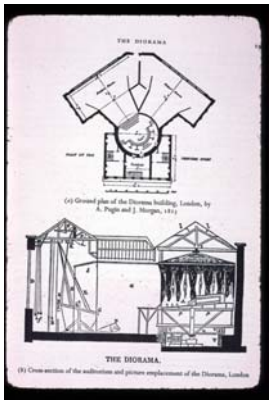


Fig.18 Diorama, London

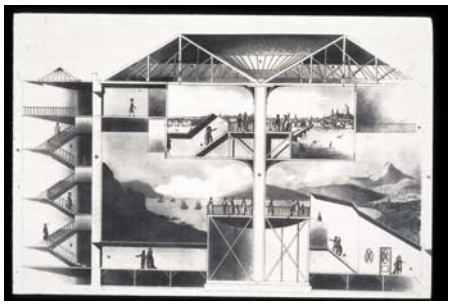


Fig.19 Panorama theatre

Fig.20 Stereo camera

Fig.21 Camera Obscurae, camera Lucida and Cloude Glass

Fig.22 Polyrama panoptique viewer

Fig.23 Stereo viewer

Fig.24 Megalethoscope viewer

- 1853 — French tissues

The small size of these objects may be one reason why they received little attention in the 20th century. The fashion for miniature art seems to have diminished. The second half of the 19th century had a different audience and a different aesthetic. These objects are important, nevertheless.

French tissues need to be exhibited like fine art objects, and moreover in a special viewer, or with transmitted light. Historically they were exhibited in a special viewer called a Brewster viewer, which had a mirror, or lead foil on the top for changing the angle of light passing through the lens. These viewers are very rare now. The exhibition issue is very important for French tissue stereo cards, since the use of transmitted light for exhibiting them may create problems in a preservation context. How strong should the

Fig.25 Brewster-viewer

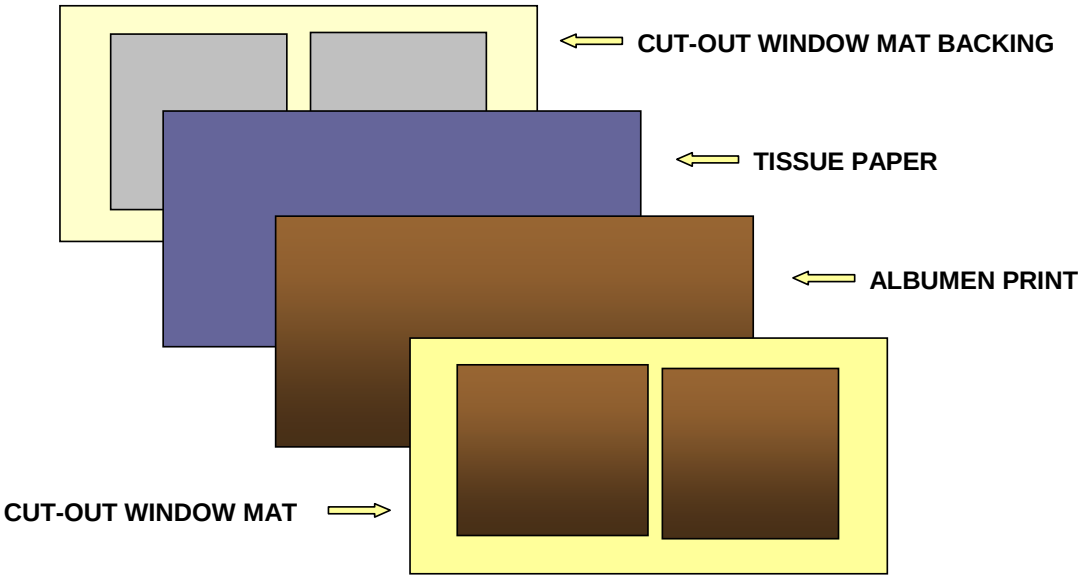
light source be? What level of light is reasonable and safe? It is complicated to exhibit French tissues, but without exhibiting them it is difficult to show the real beauty of these paper stereo cards.

These fragile miniature objects need to be conserved and, in many cases, restored, for the future. For the responsible preservation of French tissues, it is necessary to know about their history, structure, and aesthetic.

Fig.25 “LA BELLE AU BOIS DORMANT” in reflected li

Fig.26 “LA BELLE AU BOIS DORMANT” in transmitted light

FRENCH TISSUE STEREO TRANSPARENCIES STRUCTURE



The History of French Tissue Stereo Transparencies

J. L. Tardieu (1853)[*]* demonstrated that positive prints on thin translucent paper could be mounted between two glass plates or on a card that had been cut out to make a frame. The image, sometimes tinted, could be viewed against a source of light as a transparency. From the beginning it was most common to use two glass plates for tinted transparencies. The glass was heavy and easily broken, however.

The earliest French tissues were salt prints made on thin paper.

Fig.27 PST, salt ed paper print

They had no tissue paper on the back and usually had no card backing. Later, the majority of French tissues were albumen prints on very thin paper (for translucent effect). Cardboard frames were soon invented to make them easier to handle. However, these transparencies were still very fragile and risky to use because the paper was very thin and they were easily damaged, especially in a viewer. This is why the tissue paper backing and a backing mat board frame were invented almost immediately.

Another purpose of the tissue paper backing was to diffuse the image. Different types of tissue paper were used for this. Sometimes a very thin tissue was used, and sometimes a heavier, thicker tissue or just very thin paper was used. The density level of the photographic print and the amount of painting that would be required may have determined which of these materials was used.

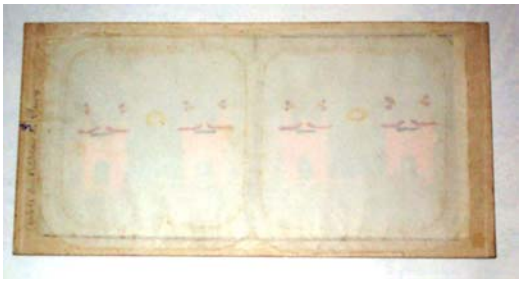


Fig.28 PST No backing frame

[*] Darrah, W. *The World of Stereographs*, Gettysburg, Pennsylvania, 1997,p 11.

In some cases, the thin tissue paper was used primarily for diffusion. In other cases, when both the photograph and the tissue were tinted, a thicker tissue or a thin paper was used, which was then pierced and waxed for additional effects. The earliest tissues (those created before 1857,

Fig.29 PST The back, assembled with five strips of heavy paper.

the year stereos were copyrighted) are unique and rare. They were made only in Paris by individual photographers. The years before 1857-1858 could be regarded as a “pre-tissue” era, when photographers were very likely doing everything by themselves (hand coloring, pasting the image to the frames, piercing, and waxing). These French tissues were of very good quality; usually the condition of the salt or albumen print is still very good. Later on, publishers would take over many of these operations.

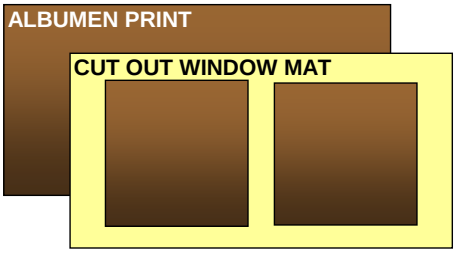
The style of the earliest tissues evolved. A unique mat structure is seen in the earliest tissues. Originally, the back of the mat was designed with five separate parts. The back was assembled with five strips of heavy paper laid down sequentially. First, three vertical strips were pasted down; then two longer horizontal strips were attached across the top and bottom. The cut-out window mat used on the back appeared later.

Fig. 30 PST The back, assembled with five strips of heavy paper

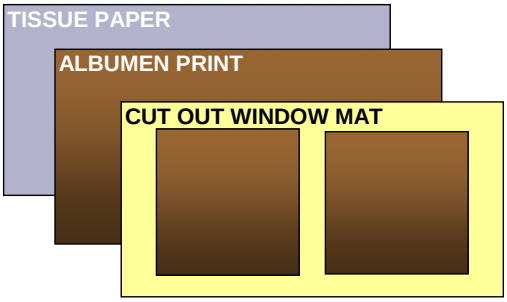
Evaluation of French Tissue Stereo Transparencies

Structure

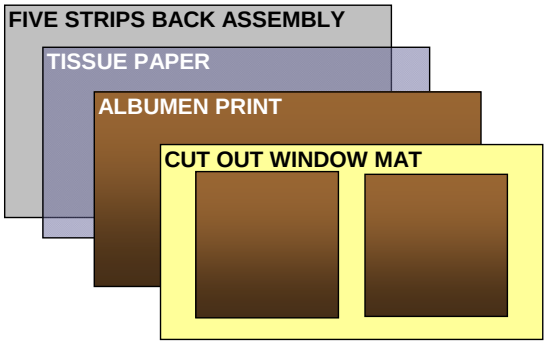
1853-?



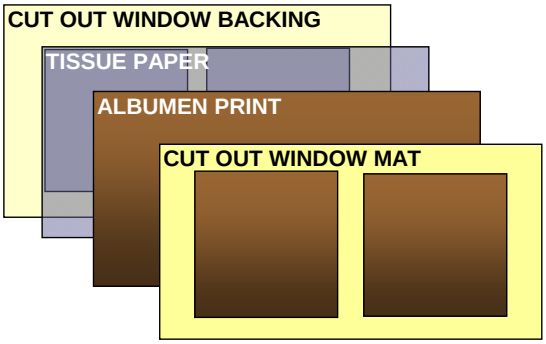
1854-57



AFTER 1854 FOR SHORT PERIOD



1857 - BEGINNING OF 20TH SENTURY



The cut-out windows on the front part of the mat had an arch shape as in traditional stereo cards. These earliest tissues are very rare.

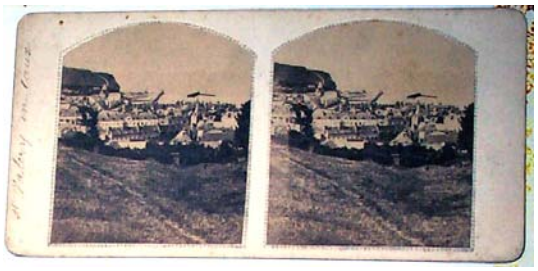


Fig. 31. PST with arch shape of the cut out window mat

Between 1857 and 1862 French tissues became more commercial and their structure became more streamlined. Examples of these are also very rare, and they are of high quality. The back of the mat was a one-piece cut-out mat board. The tissue paper was white, and sometimes blue, which was used to create a night-time effect.

Some of the best French tissue stereo cards were made between 1862 and 1865. They are often found today in very good condition, beautifully preserved. The albumen photographs were of good quality and were well printed and processed.

Fig.32 PST “PANORAMA DE LA LALUTE…

A photographs from this time in good condition can have a purplish (cool) or sepia (warm) tone. The hand coloring is very fine and delicate in tissues of this period. The mat most commonly is a neutral color. The mats in tissues from this period are rectangular with rounded corners.

Fig.33 PST with rare shape mat with circular top from early 1870s.

The color of the tissue paper varied; both blue and red tissue was used. However, white tissue paper was still the most common.

Fig.34 PST with blue tissue paper from the back

Many French tissue stereo cards were made between 1862 and 1863. They were produced not just in France, but internationally. Sometimes it is possible to find some English, German, or Italian examples from this time period, and even later American ones.[*] Still, France continued to publish the greatest number of tissue stereos. There were many more varieties of French tissues after 1861. Window openings of different shapes were manufactured; for example, circular windows appeared in 1861 (but these were not very common). But actually it is not possible to analyze the date through the shape of cut out windows. All of them should have been designed on the same time, from the early beginning, as a following of the various shapes earlier used for stereo daguerreotypes. Mat colors varied after 1862. In fact, the evolution of this type of stereo card closely matched that of regular stereo cards.

The quality of French tissues changed dramatically for the worse in 1870. They became very commercial. Publishers had learned how to make more money, faster. This is why the late French tissues, especially those produced closer to the 20th century are usually of very poor quality and in very poor condition. Eventually, they were no longer made.

Fig.35 PST "Hermitage, Sanct Petersburg" in reflected light

(PST from Tex Treadwell collection)

CULTURAL AND SOCIAL OVERVIEW OF THE USE OF STEREO TISSUE TRANSPARENCIES

The general idea behind a French tissue was to be able to see monochrome image with reflected light without a viewer, and then, using transmitted light and a viewing device, to see the same image (but not always the same scene) in color. The viewing device was also used to give a three-dimensional effect, like that seen in other types of stereo cards. Actually, the French tissue was invented as a variation of the regular stereo card. The same subjects were used for French tissue stereo cards and for regular stereo cards, such as beautiful views of different countries, unusual landscapes,

architecture, still life, historical events, marine landscapes, and narratives, as well as balloons, railroads, ethnographic types, nudes, and many others.

Fig.36 PST "Hermitage, Sanct Petersburg" in transmitted light

[*] Darrah, W. *The World of Stereographs*, Gettysburg, Pennsylvania, 1

French tissue stereo cards and regular stereo cards do not share the same aesthetic, however. The French tissues had a more theatrical aesthetic. Even the hand coloring can be very different from that seen in other stereo cards. It can be very delicate and sophisticated, and it can be also be garish and poorly done. It is, in a way, like stage make up. This may be the reason that the series "Les Theatre de Paris" were the best and most popular tissue stereo sets. The novelty and mystery of tissue transparency stereo cards made them attractive to their 19th-century audience. Especially popular topics in the 19th century were the "Diableries"(narrative images of the devil and hell), theatrical subjects, and historical recreations, such as the French revolution.

Fig.37 PST An example of "Les Theatre de Paris"

Denis Pellerin's collection in Paris contains beautiful "theatre" sets. One set from 1869 is entitled "Les Huguenots," published by Block. Habert (the best modeler in Paris) modeled the small figures in the photographed scene, and Francois Benjamin Lamiche was the photographer. There are twelve tissues per set, with very fine hand painting and in very good condition. This type of set probably was made to sell to the patrons of the theatre performance. Dramatic tableaux from each act of the play were presented in this stereo souvenir set.

The process of creating these sets was quite interesting. Because it was impossible to take a clear picture of moving subjects (for example, dancers in a ballet), small clay figures were created and dressed by a modeler, who also made set decorations. These staged scenes were then photographed. The figures were then repositioned for another image. There is no information about these clay figures in the literature. What happened to them after they were photographed remains a mystery. Denis Pellerin, in his research of this type of stereo, was unsuccessful in finding the answer to this question. A unique illustration of one of these tissues (Le pouvoir du Diable Tirage Hennetier, 1868) showing the modeler's hand in the image can be found in *La photographie stereoscopique*, written by Denis Pellerin for the Bibliotheque Nationale. This image is significant because it provides a sense of the original scale of the stage and figures.

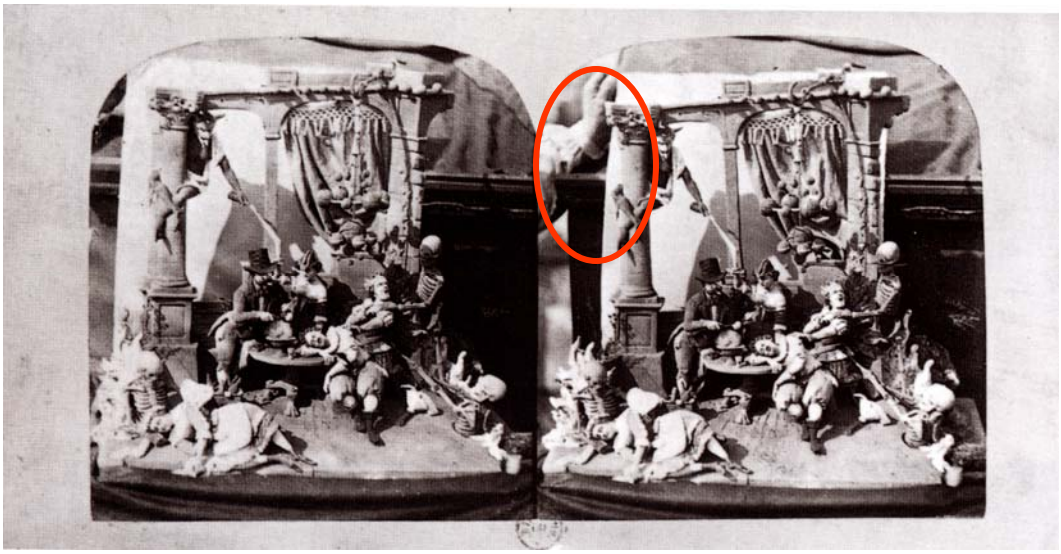


Fig. 38 A unique illustration , showing the modeler's hand in the image

Sometimes, information about the team who created a set of French tissues can be found on the mat. In some cases, initials (for example, BK for Block) can be found in a corner of the mat; usually these initials belonged to the publisher. It is often impossible to discover the name of the photographer who actually took the camera image. Sometimes the initials were printed in a specific location on the mount. Some researchers believe, that in cases when there is one letter appearing on each corner (this is very rare), the clockwise order from the upper left corner was publisher, publisher's wife, modeler, and photographer. So, for example, the publisher's initials were in a left top corner, his wife's in a right top corner, the modeler's in left bottom corner and finally the photographer's in the right bottom corner. Another theory is that these represent the names of previous publishers of the same topic. No one knows for sure if either theory is correct.

In some later editions of PSTs the figures and all of the decorations look very flat, like paper cutouts. It is possible to find two versions of the same scene, both containing the same images but looking quite different (this is especially true of "Diableries"). In one version, the figures and all decorations look very realistic, and in the other, everything looks one-dimensional (like in a "Paper theatre"). In some cases it is possible to find the edition number on the albumen print. Some researchers think it is possible that photo-collage, rather than original clay figures, was used in later editions of very popular sets. At this time, however, there is no evidence to support this theory.

Surprises-"Effect de jour et de nuit"

Some tissues revealed one image with reflected light and a different image (not just different colors) in transmitted light. These were called "surprise" images (*effect de jour et de nuit* in French). "The fire" was a very common trick in French tissues.

Later in 1870s this idea of surprises and tricks appeared commonly in megalethoscope slides.

Fig.39 PST "L'ARSENAL" in reflected light

Fig. 40. PST "L'ARSENAL" in transmitted light

Fig.41 PST "THE MARBLE PAPCE, SANCT PETERSBURG" in reflected light

(from Tex Treadwell collection)

Fig.42 PST "THE MARBLE PALACE, SANCT PETERSBURG" in transmitted light

THE VALUE OF FRENCH TISSUES IN THE NINETEENTH CENTURY

French tissues were quite expensive in the nineteenth century. The following prices were found in *La Lumiere* from April 24, 1858 (advertising for the Alexis Gaudin firm):

Effect de jour et de nuit (surprise)	36 francs (for 12 views)
Vues transparentes (regular PSTs)	2 francs (for 12 views)[*]

In the early 1860s PSTs showing the Imperial Palaces were 24 francs for a set of a dozen. Illuminated (pinpricked) views were from 10 to 15 francs a dozen. In the late 1860s illuminated views ranged from 8.50 to 21 francs a dozen. Two years later they ranged from 7.50 to 18 francs. By the end of 1874 they cost from 5.50 to 15 francs. Prices remained stationary afterwards.[**] French tissues were about twice the price of ordinary stereo views.

At the beginning of 1860s the average salary of a working-class individual in Paris was about 3.85 francs a day. In the countryside it was much less—1.82 francs a day.[***] These were expensive toys, which required a special and very expensive viewing device. Only the wealthy could afford these charming optical toys in the nineteenth century.

CONCLUSIONS

French tissues represent a significant step in the history of imaging. They can be regarded as an early link between still photography and motion pictures. Like magic lantern slides, tissue stereo transparencies are among the earliest images to show action and movement. The scenes change before our eyes as day becomes night, a building bursts into flames, or a visitor from the spirit world makes an entrance. All of these things happen in a two-part sequence because of the action of light on one small but finely crafted object. Early motion pictures used some of these same ideas, such as the tableau device to emphasize a dramatic situation, and especially the technique of superimposing an image (a vision or spirit) on the scene.

Conceivably, there is also a link between tissue stereo transparencies and theatre in the nineteenth century. Like the theatre of that time, tissue images were highly illusionistic. The hand coloring can be vivid, even crude, but it is usually hidden and diffused by the tissue paper backing. They work their magic only when they are not examined too closely.

Finally, there could be a link between these objects and modern optical toys such as some of the early View-Master slides, or the animation technique known as "claymation," which uses clay

[*] La Lumierre, September 30,1864

[*] La Lumierre, September 30,1864

[***] McCauley,A. A.*A. Disderi and the Carte de Visite Portrait Photograph,* Yale University Press: New Haven and London, 1995.

figures posed in different ways to create animation. The “Diableries” or “Les Theatres” may have been an inspiration for this.

Deterioration

The nature of French tissue stereo deterioration is multi-faceted because of the complex history and structure of these objects.

The most commonly encountered forms of deterioration include fading, yellowing, mechanical damage (tears, losses), biological damage (foxing and other brown stains), chemical deterioration (oxidation, discoloration of cut-out window mats), and complications resulting from previous repairs, such as the use of “scotch” tape.

I. FADING

Experience tells us that albumen prints fade over time. Most French tissues are albumen prints. There are many examples of faded paper stereo transparencies in collections around the world.

Some collectors believe that these objects are not really faded but that they were intended to look as they do, in order to enhance the impact of the color version of the image as seen through transmitted light. There is an opinion that an albumen print with not very high contrast will look much better in color with transmitted light. This may or may not be accurate.

The density and contrast of the albumen prints in the earliest French tissues usually is very good.

Fig.1 PST. Good condition (transmitted light)

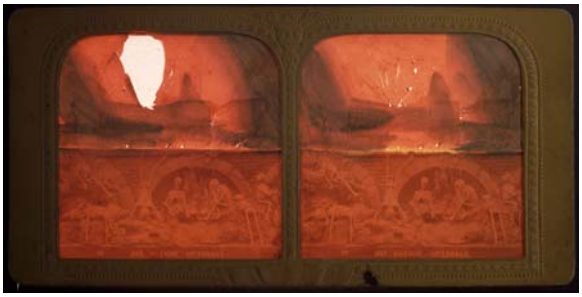


Fig.2 PST. Poor condition (transmitted light)

It is surprising that some of these objects have survived for over 150 years, given the fact that they were kept in different environments and were regularly subjected to transmitted light from the back when they were viewed. One explanation for this is that these stereographs were not commercially produced in the early years, when the production process was a careful crafting of beautiful, very rare novelty objects; the photographers worked with great care in creating them. After 1857, the stereographs were made commercially, but still the quality was very high. The best tissues were made in France from the 1860s through the beginning of the 1870s. From the end of the1870s the quality declined. The manufacture of French tissues changed a lot; the main goal became to make them faster and more cheaply.

It is very clear that the quality of the later French tissues is much lower. The result of this is very yellowed and faded albumen prints. Poor processing of positives from the beginning, use of low-quality materials, and aging are the reasons that these beautiful photographic objects are deteriorating so fast.

Fig.3 PST. Very poor condition (reflected light)

The popularity of French tissues continued in the USA, but it did not last very long. Of course, some popular tissue sets that were used heavily are

very faded and yellowed (sometimes even the earliest tissues).

Fading and yellowing are the number one problems. These are the results partly of the original processing and partly of environmental changes, due to the fact that the cut-out windows on the back did not provide a barrier against RH changes and air pollution. These objects are very susceptible to moisture and changes in humidity levels. Moisture content is a critical factor in the fading process in albumen prints. Historically, tissues did not have any special protective system of housing because of their structure. Usually they were kept in a box (vertically or horizontally). The cut-out mat board window design allowed for air penetration between cards.

Fig.4 PST. Very damaged by use (reflected light)

Even the best-quality albumen print will fade and turn yellow if used, displayed, and subjected to high temperatures and high humidity.

Even the best quality albumen print will fade and turn yellow if used, displayed subjected to high temperatures and high humidity.

II. MECHANICAL OR PHYSICAL DAMAGE

A large number of French tissue stereo cards have mechanical or physical damage, such as tears and losses.

Fig.5 PST with tears(transmitted light)

The sandwich structure of this format makes both the albumen print and the tissue paper very susceptible to damage. Every time these objects are exhibited in a viewer, the potential for mechanical damage exists. All tears and losses on the albumen print or tissue paper become very visible, especially with transmitted light. Tears and losses on the albumen print and on the tissue paper destroy the whole impact of the French tissue. Collectors and anyone else who cares for French tissues often try to fix these problems by themselves, which usually creates new problems. The use of different kinds of scotch tape, mending, and lining by someone other than a trained conservator can cause additional damage to this type of stereo card.

Fig.6 PST. The loss of the tissue paper on the right

Fig.7 PST. The loss of the albumen print on the right

Typically, owners of French tissues do conservation treatments by themselves. Conservation treatment by nonprofessionals is an important separate issue. This is especially important when the objects are small and have a complicated structure, as in the case of the French tissue format.

Fig.8 PST. Left part of the card pasted overall with conteporary paper.The reason is to fix the tears.(image in UV radiation)

An important consideration is the choice of materials that can be used for conservation treatments. All materials (paper, tissue paper, paste) have to be of archival quality. These can be difficult to find and are often expensive. Sometimes it is nearly impossible to buy treatment materials in a small format (e.g., paper) or in a small amount (e.g., starch paste). Therefore, people often use improper and inexpensive materials. The deterioration resulting from the use of scotch tape, for example, is very common on French tissues. Scotch tape mending has often been the first treatment used by the nonprofessional to repair tears and losses on these objects. All issues related to use of scotch-tape type adhesives lead only to more problems. Each wrong step only creates more potential deterioration problems.

Fig.9 PST. The scotch tape damage in the right (reflected light)

Fig.10 PST. The same (transmitted light)

Fig.11 PST. Back of the same PST with scotch tape damage

Fig.14. An example of colored gelatin inserted between albumen print and tissue paper.

Fig 12. An example of cuts made on purpose

Professional skills are another very important consideration. There are many professional tricks in the conservation of this kind of object.

It is important to distinguish between different types of tears. Many are deliberate, such as cut-out tears, made on purpose to allow more light penetration. It is easy to recognize these cuts. They usually are in the same place on both the left and right part of the stereo card; also they have exactly the same shape, although not necessarily the same size. Additional tears often originate at these sites, due to the tension of the albumen print.

Another type of physical deterioration is related to the red, blue, and green colored gelatin that was used to enhance the color transparency effect. Small (and sometimes large) pieces of

colored gelatin film were used for making color lights, colored gelatin covered punched or pricked holes, or provided a colored background, especially red, colored gelatin film were inserted between the albumen print and tissue paper. For making these color light effects, the gelatin was applied while it was still warm.

The tissue paper would contract as the gelatin cooled. This created tension on the tissue paper, making it very tight and, consequently, more fragile (Fig. 13-14).

Fig.13. An example of tension on the tissue paper.

III. BIOLOGICAL AND CHEMICAL DETERIORATION.

A very common kind of deterioration found in French tissues is yellowing, brown spots, and stains on the tissue paper and albumen print. Investigation of paper discoloration has shown a clear connection between individual stains and other, more extensive, forms of paper browning.

Foxing is the common name for brown spots on paper. A connection has been found between foxing formation on French tissues and paper production, the duration of the paper's exposure to light, how dirty the objects are, and their environmental storage conditions. Ultraviolet investigations have revealed that some kinds of foxing show heavy fluorescence at the initial stage of development.

The foxing formation mechanism has been discussed by paper conservators, chemists, and biologists. These yellow/brown stains of circular or irregular shape have been fully described in conservation literature, but still there is no overall scientific agreement, and many different hypotheses exist. According to research conducted during the last 20 to 30 years, foxing spots may be ascribed to two or possibly three different mechanisms.

One form of foxing is said to be due to the corrosion of metal impurities in the paper (Fig.15-16)

Fig.15 Inorganic foxing (top part of tissue)

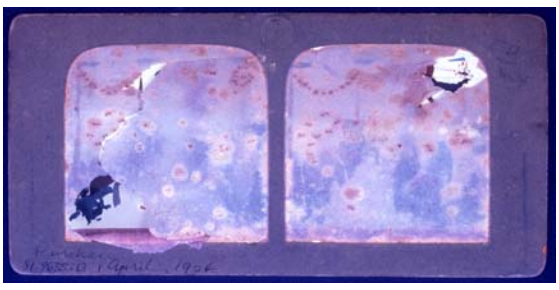


Fig.16 Inorganic foxing. Not fluorescent in UV radiation.

Another form of foxing is thought to be caused by the metabolic products of microorganisms (Fig. 17-18).

Fig17.Foxing caused by metabolic products of microorganisms (front)

Fig.18. Foxing caused by metabolic products of microorganisms. Fluorescent in UV radiation

A third theory proposes a combination of these two mechanisms acting together. In other words, foxing could be organic, inorganic, or a combination of the two (Fig.19-20).

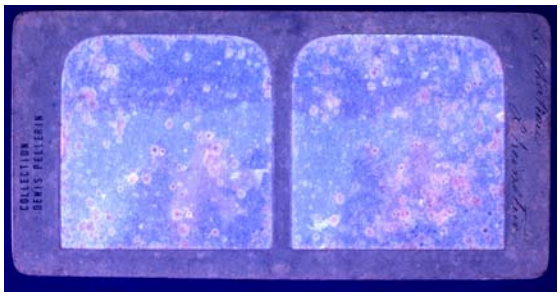


Fig. 19. The combination of both types of foxing in UV radiation (back).

Fig.20 The combination of both types of foxing in UV radiation (front)

In the case of French tissue stereos, it might be a combination of two different kinds of foxing. A survey of several collections showed that foxing deterioration is more common in the French tissue format than in regular stereo cards. A possible explanation can be found in the structural difference between the two types of stereos. The two layers (albumen print and tissue paper) without a protective backing mat create much more opportunity for air penetration. Pin-pricking (usually done from the albumen side, but sometimes from tissue side also) allows even more air to enter the space between the albumen print and tissue paper. This works to increase the moisture content inside of this sandwich and thus within the paper itself. On another point, the pin-pricked holes, which were most likely done with metal needles, and which therefore could leave some small metal particles behind, is one more possible reason for the development of foxing on French tissue stereo cards. There are many tissues in different collections with foxing deterioration where punched or pricked holes are located.

The other biological deterioration seen in French tissues is damage caused by insects, such as silverfish. It is a very typical problem for all paper objects (Fig.21). This deterioration is not as common as foxing, but it does occur in humid environments.

Fig.21 Deterioration caused by silverfish

IV. DETERIORATION OF CUT-OUT WINDOW MATS

The structure of the earliest mat board protection frames was different from those that appeared later. There was no corresponding frame on the back yet, just tissue-paper backing for protection and diffusion purposes at the beginning. Later, five pieces of thin mat board were used for making a frame only on the back of the object. The next step in a protective mat board frame was the same cut out window mat, placed on the back of the card.

The color, design, thickness, and quality of window mats evolved during the short history of French tissue stereo cards. The earliest window mats were of higher quality than later ones. These were constructed using a greater number of paper layers pasted together more properly, which resulted in a denser protective structure. The paper fibers in the earlier window mats did not contain as much lignin as later ones. Typical early tissues have little color variation of the front part of the window structure. These mat boards also show little oxidation and foxing deterioration. The colors on the fronts of later cut-out window mats were much brighter and richer (for example, bright orange, pink, blue, red, and even black).

Of course, the use of heavily colored mat board was partly due to a changed esthetic; but another reason for changing the color was to make deterioration and other changes less visible. Sometimes the back part of a mat board frame was the same color as the front part. Some of the latest tissues have no color on the mat board, and some of them are just a version of the very cheap, very low-quality French tissue transparency.

It is very clear that the condition of cut-out mat boards is very dependent on when each set was made. The condition of these objects is also very dependent on changes in the paper industry.

After 1850, big changes in the papermaking industry occurred. Wood pulp was added for making paper. Later there was a larger percentage of wood pulp used in papermaking. Those papers were cheap and of poor quality. (See Fig. 22.)

Lignin is a component of wood pulp. The lignin content in paper increases the possibility of oxidation. Papers that contain lignin have a much shorter life than cotton or rag papers. The changes in French tissue stereo transparencies reflect these changes in the industry, because they were commercially manufactured. Some of the papers used in the French tissue stereo card manufacturing process (i.e., the tissue paper and the paper used in the mat boards) changed for the worse during the history of this photographic

Fig.22 An example of latest version of PST

format. The same situation occurred with the glues used in making mat board and for keeping the layers together.

The nature of the deterioration of the French tissue format, therefore, is generally the same as that of other commercially made paper objects from the nineteenth century.

Conservation Issues of French Tissue Stereo Transparencies

GENERAL OBSERVATIONS

Issues regarding the conservation of paper stereo transparencies are discussed using examples from the collections of the George Eastman House, Tex Treadwell, Denis Pellerin, Pierre Tavlitsky, and the author's case study collection. Ten objects with different types and stages of deterioration were chosen for case studies.

Before treatments were begun, condition reports were written and photographic documentation (35mm slides) was prepared. These slides recorded front and back in reflected light, front in transmitted light, and, in some cases, back in transmitted light. Some details of deterioration also were documented. Photo documentation in UV radiation was taken to illustrate biological and chemical damage and some deterioration from previous restoration treatments. Digital images also were made.

The proposed conservation treatments were discussed with other conservators having experience with various paper transparency objects. Photo, paper, and painting conservators were asked about their conservation experience with similar objects, i.e., those producing a translucent effect. Collecting this kind of information was helpful for creating a reasonable treatment proposal.

From the beginning it was clear that the first step would be to decide upon the degree of conservation intervention. Treating French tissues is a complicated problem because of the complexity of their structure and the impossibility of performing most conservation treatments, such as mending or filling losses, without taking the objects apart. It is the author's opinion that it is always better to avoid radical intervention treatment of the object if possible. However**,** to appreciate the full visual effect of French tissue stereos, these complex objects must be in very good condition. Tears, losses, and stains dramatically minimize their unique beauty and aesthetic value.

In general, the deterioration of French tissue stereos can be divided into two categories.

1. *Yellowing and fading of the albumen photograph.* Unfortunately, there is no accepted conservation treatment for reversing this deterioration. Preventive conservation is critical. It is important to have proper storage to slow down deterioration.
2. *Mechanical and physical damage of the paper stereo transparencies.* The physical structure, the storage environment, and the history of these photographic objects have created a range of physical stability problems.

SURFACE CLEANING

10 paper stereo transparencies (PST's) from different collection were chose for conservation case studies. Surface cleaning is typical first treatment in conservation plan. Some of the tissues were extremely soiled. The sandwich structure of these objects complicates surface cleaning procedures. Usually there is dirt on the cut-out window mat mount, the albumen print, and the tissue paper. Dirt also accumulates on the borders between the window mat and the albumen print. The surface cleaning were started from cut out window mat.

The window mat was cleaned with ground Staedtler Mars eraser. The albumen photograph was cleaned with a cotton swab and a water/ethanol (1:1) solution. A soft brush and ground eraser were used on the tissue-paper side (locally).

DISASSEMBLY

Various methods for the removal of the window mat were tested in order to find the safest and most practical procedure. A major complication was the stability of the watercolor in the presence

of moisture. All watercolor painting is hidden inside the paper/photograph sandwich, making it impossible to test the color for stability to water. This sandwich is thin (layers are very close together). Any water penetration will leave residual watercolor marks on the tissue paper if watercolor is impermanent. Most watercolors from the nineteenth century are more or less stable in water, for except madder red, aquamarine blue, and varieties of magenta.

- *Mechanical mat removal.* (Fig.1) To avoid the use of moisture, a mechanical method of mount removal was first tested. However, the result was not acceptable, even though in certain cases it was very easy to remove the cut-out window mat from the recto and verso. However, the structure of the sandwich layers of the most valuable (i.e., earliest)

Fig.1

tissues and also those dating from 1860 to 1870 is much stronger. It was therefore very difficult to remove the mount without creating little losses on the edges of the albumen print and tissue paper. This method did work for the latest French tissues.

- *Removal using water*. Disassembling the mount by immersing the whole object into water was also tested (Fig.2). This method is very risky and not recommended for use by those without paper conservation experience. It is hard to predict which colors are safe with water. Also, albumen is very sensitive to moisture, and washing can result in albumen cracking. The object was immersed in water for 40 minutes. After removal from

Fig. 2 The whole object in water

the water, the mat frame from the front lifted easily, without any physical force (Fig.3). However, this method is unpredictable. For this test, an object without heavy watercolor was chosen. If there are bright, rich colors, this method probably would not work.

- *Mount removal with Gore-Tex humidification.* A damp pack was constructed of Gore-Tex (Gore-Tex membrane laminated to 1/16 in. polyester felt), a damp blotter, and a sheet of window glass. Paper Stereo Transparency (PST) was inserted between two sheets of Gore-Tex. This pack was left for two hours. It was then noted that the adhesive had swelled enough to safely lift the cut-out window mat from the rest of the sandwich. It was

likewise possible to remove the backing from the tissue paper and to separate the albumen print from the tissue paper. This test showed that the Gore-Tex pack humidifies the whole object more than enough. The albumen print was very damp, and, in this case, the watercolor was somewhat sensitive to moisture, and some watercolor bled on to the tissue paper. But, in general, this method was much safer than dry disassembling or immersing the whole object in water.

- *Mount removal using steam.* The steam from a textile steamer was quickly driven through the cut-out window mat, swelling the adhesive layer. It supplied just enough heat to swell

Fig. 4 Albumen prints after disassembly

Fig. 5 Tissue papers after disassembly.

the animal glue without providing too much moisture, which was much safer for the albumen print and for the watercolor. All layers of the French tissue were separated. This was safest method tried. After separation, a thin layer of adhesive residue was present on all parts of the sandwich. Drying was very stressful for the tissue paper and the albumen print and resulted in tears (Fig.4). To avoid tears, these two layers could be placed between two pieces of “Holytex” and under light pressure until they become flat.

TAPE REMOVAL AND MENDING

Tape is very common problem for French tissue stereo cards.

Tapes/adhesives commonly found are:

- Paper tape with water-soluble adhesive
- Cellophane tape, PST (Pressure Sensitive Tape yellow
- Mending tape, PST colorless, invisible

CASE STUDY: TREATMENT 1

A. A window mount was split mechanically, across its top half (this is a very risky procedure). The mount was split so that the albumen print was still adhered to the front half of the window mat and the tissue paper to the back half.

B. The tape carrier was removed mechanically and with local heat application (Fig 6-7).

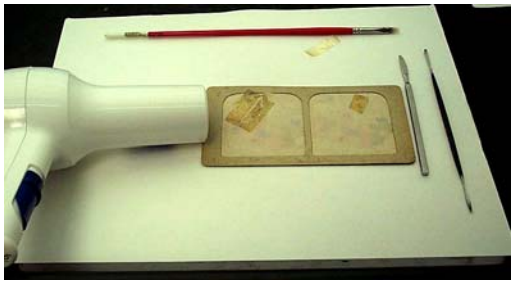


Fig. 6

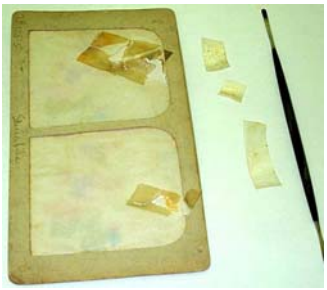


Fig. 7

Fig. 8

Fig. 9

C. A small piece of thin glass was slipped between the albumen and tissue layers (Fig.8-9).

D. Solvent 60% toluene/40% acetone was applied locally to the tape adhesive residue. The glass acted as a barrier to keep solvent from penetrating into the other parts of the stereo-view. After the solvent dried, this procedure was repeated a few times. After multiple applications, the adhesive residue was greatly reduced.

E. After tape removal, a piece of glass wrapped in a sheet of “Holytex” was inserted between the albumen print and the tissue (Fig.10).

Fig. 10

Fig. 11

F. The tears were mended with Japanese paper strips (Paper RK 0) and wheat starch paste on a light table. There are two layers: albumen print and tissue paper in PST’s, they still should be separately after treatment, to avoid sticking during the mending; wrapped glass was used between these two layers. Why glass? Because it was necessary to use something translucent for successful mending. Mends were dried with a low temperature tacking iron through “Holytex” and blotter paper (Fig.11).

G. Losses were filled with modern albumen paper, and adhered with wheat-starch paste.

Figs. 12 and 13

H. The top half of the stereo card was re-adhered with dry wheat-starch paste (cooked thick paste, without additional water.)

I. The object was dried in a copy press.

J. Losses and tears were retouched with watercolors.

Fig. 14. Front in reflected light before treatment.

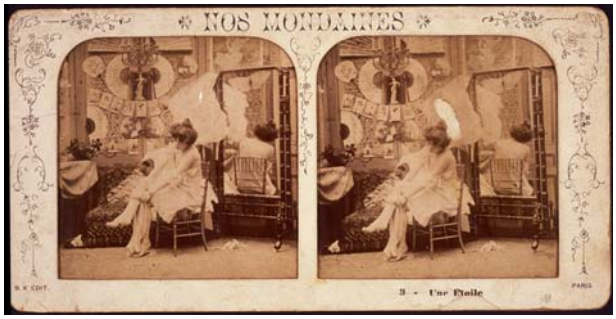


Fig. 17. Front in reflected light after treatment.

Fig. 15. Front in transmitted light before treatment.

Fig. 18. Front in transmitted light after treatment.

Fig. 16. Back before treatment.

Fig. 19. Back after treatment.

CASE STUDY: TREATMENT 2

A stereo view badly damaged with yellow PST (Pressure Sensitive Tape) was chosen for this case study. The tissue paper from the left part of stereo was absent. Tape carrier was removed mechanically (Fig.20). To study the effectiveness of solvent 60% toluene/40 % acetone overall, the whole object was immersed into the solvent for 40 minutes (Fig.21). The yellow adhesive was reduced but not completely removed (Fig.22-23).

Fig. 20

Fig. 21

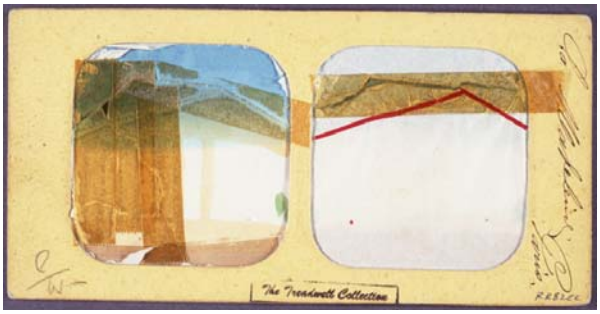


Fig. 22. Back before treatment.

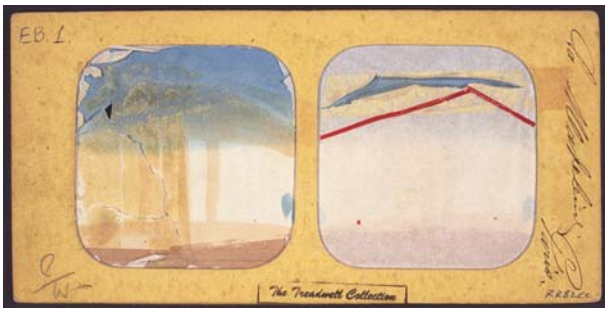


Fig. 23. Back after treatment.

WASHING AND BLEACHING

Foxing and other stains are common in French tissue stereo cards. All stains are visually disturbing in transmitted light. However, all treatments for removing the stains (washing and bleaching) can be very problematic due to the watercolors and aniline dyes. If the coloring is safe, there is still a risk to the albumen print. The following conclusions were reached:

1. Washing and light bleaching can be done if the watercolors are stable and the treatment wills not affect the albumen print. Treatment with moisture application should be done according to the standards for wet treatment of albumen prints.
2. Washing or bleaching is possible, but they should only be done when it is necessary for the appreciation of the objects.

MENDING AND LINING

The groundwork for these treatments was my conservation experience with the photographic objects, such as megalethoscope slides, which have the same idea of changing the image in transmitted light.

Tears are the most common mechanical form of deterioration in French tissue stereos. A 6% solution of “Klucel G” (hydroxypropyl cellulose) in ethanol was chosen for mending and lining to avoid moisture. Klucel G has demonstrated great potential for the treatment of moisture-sensitive photographs, especially albumen prints. In cases where the two parts of the tear matched each other (this was often not the case) Klucel G in ethanol was applied along the edges. Short fibers of thin Japanese paper were placed across the tear to hold the edges together. All of these treatments were done on the light table, as it is very important that repairs not be visible in transmitted light. Tear whose edges did not match were mended by filling the gap between the two edges of the tear with Japanese paper pulp (long thin fibers of Japanese paper). The mended tear was pressed between Holytex and blotters under minimal pressure.

Old albumen tears usually are best mended by lining the photograph with very thin Japanese paper. When lining, it is important to consider density changes. All density that the object gains during treatment will minimize its translucency in transmitted light.

Densitometry results with transmitted light:

Rolled kozo RK-0	**0.009 – 0.019 D**
Gampi M 223	**0.047 -0.063 D**
Albumen print	**0.667 D**
Albumen print lined with kozo RK-0	**0.703 D**
Tissue paper	**0.219 D**
Kozo RK-0	**277 D**
Tissue paper	**0.232 D**
Gampi M 223	**0.324 D**
White tissue paper (without color)	**0.411 D** (can vary, depending on the thickness of original tissue paper)
Oxidized tissue paper (already yellowed)	**0.533 D**

Density changes of less than 0.03 units in thin albumen prints are not critical to the overall visual effect.

CASE STUDY: TREATMENT 3

Example # 1 had very delicate watercolor painting on the back of the albumen print. After mending, a thin Japanese paper, RK- 0, was chosen for the lining procedure. Because of the thinness of the paper, the decision was made to apply 6% Klucel G in ethanol to the back of the albumen print (when using thicker lining paper, it is preferable to apply the adhesive to the lining paper instead of the object).

Fig.24 Front in reflected light (before treatment)

Fig. 25. Front in transmitted light (before treatment).

Fig. 26 Fragment in UV radiation during the treatment. Here it is noticeable that the glue residue on the edges protected the area from the further spread of gamboge.

During the lining procedure, bleeding of a yellow color occurred. This was not expected, as there was no yellow color on the back of the albumen print. After lining and drying between blotters and Holytex, both sides of the albumen print turned yellow over all, but not evenly. Apparently gamboge, a yellow watercolor pigment, was present as a component of the green watercolor that was used on the back of the albumen print. Gamboge* is difficult to recognize because it may have partially faded and the green may no longer appear green, but blue.

* Gamboge is a yellow vegetable pigment produced in south and south-east Asia from various trees. In Asia this pigment was probably in use in the eighth century, and it is still available. In Europe gamboge has been known since the seventeenth century. Many sources refer to gamboge being used to make transparent yellow varnish for decorative applications. But gamboge is best known as a watercolor pigment. For example hooker's green is the name given to a mixture of gamboges and Prussian blue (or indigo). Gamboge is relatively impermanent (it is very unstable to light). Since the colorant of gamboges is an organic resin, migration of this color over time is possible. It is very soluble in ethanol, is darkened by ammonia fumes and bleached by strong heat. In the eighteenth and nineteenth century it was a very common in watercolor in Europe.

When Klucel G was applied to the albumen print, the gamboges pigment reacted to the ethanol, bled, and stained the print unevenly on both sides.

Some Observations Regarding the Reaction of Albumen to Klucel G in Ethanol

Klucel G altered the flexibility of the albumen print. The albumen became harder after the adhesive was applied. After drying, the effect was diminished, but still the albumen print had lost flexibility.

Fig. 27. Front in reflected light after treatment.

Fig. 28. Front in transmitted light after treatment.

Pre-coated RK- 0 or 1 using 5% Klucel G in ethanol would a good choice for invisible mending (soft fibers of Japanese paper placed across the tear) on the albumen print, because in this case the Klucel G in Ethanol is not applied directly on to the albumen print.

CASE STUDY: TREATMENT 4

For this treatment, an albumen print with aniline painting from the back was chosen, in order to avoid the "gamboge reaction" with Klucel G in ethanol during the mending and lining procedure. Any application of water is very dangerous for aniline dyes, as they are very sensitive to water. After ethanol stability test mending and lining methods were choose. The PST (Paper Stereo Transparency) was treated with the methods used in the previous example. Results were good for the painting, but the albumen print had the same reaction on the adhesive as in the previous case study. To avoid usage the solvent-pre-coated RK 0 or 1 (Klucel G in Ethanol) can be recommended for invisible mending and even lining in some cases.

Fig. 29. Front in reflected light after treatment.

Front in transmitted light after treatment.

CASE STUDY: TREATMENT 5

Example #3 had very delicate water color painting on the back.

Fig. 31. Front in reflected light before treatment.

Fig. 32. Front in transmitted light before treatment.

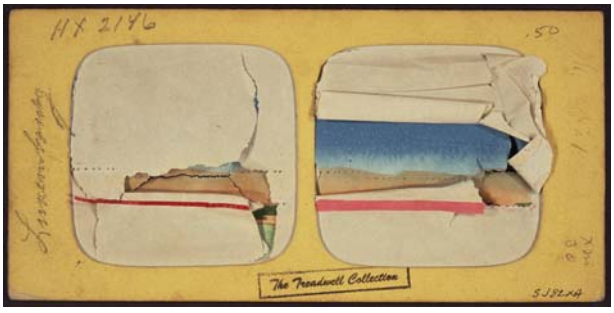


Fig. 33. Back before treatment.

After water stability tests, a traditional “dry” starch paste lining was applied. The flattened dry albumen print was placed on the light table, albumen side down on a sheet of Mylar®. The surface of the watercolor side was slightly humidified with distilled water mist. All tears were carefully aligned section-by-section and adhered together with dry wheat starch paste. Immediately after this procedure, light local pressure was placed on the mended areas with Holytex and blotter paper in between to hold edges together. After all tears were mended, starch paste blended with enough additional water to keep still thick consistency was applied overall. After removing the rest of the paste, Japanese RK- 0 paper was placed on top of the mended back side of the albumen print. Light distilled water misting was used to apply the lining paper properly, without wrinkles and folds. A soft Japanese brush was used to smooth the surface of the RK- 0. All these procedures were done on the light table with transmitted light. After lining, the albumen print was placed under the glass between Holytex and blotter paper. Light weights were used for holding tears together and for properly adhering the lining paper to the albumen print. The blotters were changed every few hours on the first day. After a few days the weights were removed, but the lined albumen print was kept between the Holytex and blotter paper under the glass.

Fig. 34. Front in reflected light after treatment.

35. Front in transmitted light after treatment.

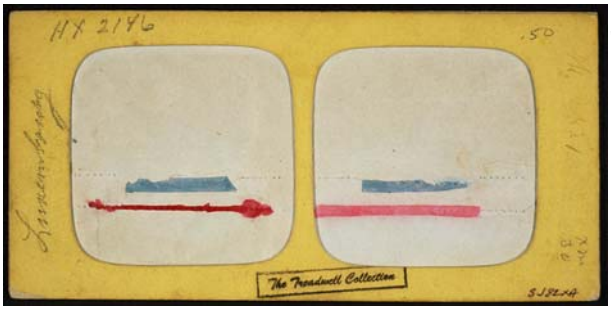


Fig. 36. Back after treatment.

MENDING AND LINING OF TISSUE PAPERS

The mending and lining of the tissue paper part of the French tissue stereo followed the same procedures as those used for treatment of the albumen print.

MENDING WITH HEAVY WATERCOLOR PAINTING

In cases of a heavy watercolor painting, one of the following methods of mending can be chosen after the sample has been tested for the presence of gamboge pigment (test green or yellow colors for ethanol stability) and water stability:

1. Mending with Klucel G is preferable if there is no gamboge pigment in the watercolor.
2. Dry wheat starch paste can be used for mending if gamboges pigment is present.

LINING WITH HEAVY WATERCOLOR PAINTING

1. Lining on Japanese RK- 0 paper with Klusel G is the first choice (if no gamboge pigment is present in the watercolor).
2. In some cases, Klusel G coated on RK- 0 and reactivated with ethanol mist may be use (with great caution) for heavily painted tissue paper.

MENDING WITH LIGHT OR NO WATERCOLOR PAINTING

If there is no heavy watercolor painting on the tissue paper, the methods of mending described above can be used, after testing for ethanol and water stability.

LINING WITH LIGHT OR NO WATERCOLOR PAINTING

Lining on Japanese RK- 0 paper with Klusel G (if there is no gamboges pigment).

1. Traditional wheat starch paste lining technique.

In this case (after water test) diluted starch paste can be used with caution. If there is no watercolor painting on the original tissue paper, a traditional wheat starch paste lining technique can be useful.

If there is no watercolor painting, and no piercing, gelatin insertions, or special cuts for more translucent effect, a traditional wheat starch paste lining technique can be used.

If there are many tears and losses, replacement with new tissue paper can be reasonable. In this case some choices of tissue paper and paper can be prepositional:

- Archivart “Lense tissue” or Archivart “Unbuffered tissue” would be a good choice for replacing light-weight tissue paper parts of French tissue stereo transparencies.
- Archivart “Photo-tex tissue” is an acceptable choice for replacement of original tissue paper of a heavier weight.
- Archivart “Lining” or “Silversafe” papers are adequate in cases where the original tissue paper is not actually tissue, but lightweight paper.

TREATMENT OF CUT-OUT WINDOW MATS

After disassembling, the window mat cards usually had adhesive residue inside both front and back parts. To remove the rest of the animal glue, washing was acceptable, if all stamps, original inscriptions, and marks on this part of the object are stable in the presence of water. If there are labels on the back frame, it is better to remove them before treatment. After washing, all parts of the cut-out window mat were placed under a press with blotters in between. Blotters should be changed regularly, until all parts are flat and dry.

RETOUCHING

Retouching media include watercolor, dry pigments, and pastel. Retouching should be done on a light table with transmitted light. A retouched image may look good in reflected light, but look unacceptable in transmitted light.

REASSEMBLING FRENCH TISSUE STEREO OBJECTS AFTER TREATMENT

All parts of the French tissue sandwich should be dry and flat before beginning the reassembling procedure. For pasting all layers together, dry wheat starch paste was the best choice.

1. The front portion of the window mat was pasted and adhered to the albumen print, and placed under the glass with light weights with blotters and “Holytex” in between.
2. When these two layers were dry and flat, they were pasted together with tissue paper on the light table. The registration of both images (on the albumen print and on the tissue paper) should be very accurate. The size of both layers might have changed during treatment. After pasting together, the object was placed under the glass with light weights, with blotters and “Holytex” in between.
3. After drying and flattening was completed, the back part of the cut-out window mat was pasted to the back of the sandwich. The whole object was then placed under the glass with light weights, before it completely dried.

During the reassembling process the following observations were made:

For best results, all parts of the object should be completely dry and flat. Historically, animal glue was use in manufacturing of this object. This means there was no water involved in the original assembly process, which made it safe for the albumen print and the watercolor painting.

CONCLUSIONS

French tissues are relatively inexpensive. Market value depends on many aspects, such as date of production, quality level at the time of production, topic, country in which the object was published, name of the publisher and the photographer, and, finally, the current condition of the object. The least expensive tissues cost approximately $20.00 to $25.00 US, more expensive ones can cost up to $120.00 or so. This is not a very high price compared to that of other nineteenth-century photographic objects of a similar level of sophistication and structure. There are several reasons for this:

- French tissues have been generally ignored in the history of photography.
- They have different aesthetics than those commonly accepted today.
- They were produced for a very short period of time.
- Many representatives of this photographic format are in very poor condition.

Condition is very critical for French tissue stereo transparency cards. Any deterioration dramatically minimizes their appreciation. Conserving severely damaged French tissues to the state where the audience is able to experience their full effect is particularly difficult because of the unique structure and optical viewing characteristics that must be maintained.

Condition is very critical for French Tissue stereo transparency cards. Any deterioration dramatically minimizes their appreciation. Conserving severely damaged French tissues to the state, where the audience is able to experience their full effect is particularly difficult because of the unique structure and optical viewing characteristics that must be maintained if the treatment is to be a success.

The conservation assignment should be proposed according the complex of value of the particular object and stage of it deterioration. In many cases of low quality and poor condition of the artifact no conservation intervention will be recommended. Preventive conservation only will be the best conservation plan in many cases. In those cases, when the object is important, and

condition is critical, but level of deterioration is very high (a similar situation to those in this case study), it is necessary to have the professional consultation of a photo conservator, who is familiar with paper conservation.

The value of some treatments, presented in these case studies might be questioned for several reasons.

The value of some treatments presented in those case studies might be questioned for several reasons.

- Disassembling the object is risky and should be undertaken only in rare cases. The level of intrusion should not damage any layer of the object's structure.
- Washing and bleaching are very risky treatments for watercolor paintings and albumen prints. Water treatment can cause watercolor to bleed and the characteristics of the albumen to change.
- Mending and lining can be risky, because the albumen may have an unacceptable reaction to water and ethanol. Also, watercolor or aniline dyes could be extremely sensitive to ethanol and water.
- Reassembling the object should be done carefully. The various tissue layers may change size during the treatment, making reassembly difficult.

In many cases major treatments will not bring the desired result; treatment can only compensate for certain forms of deterioration.

Conservation treatment of French tissues is relatively expensive. It is not unusual for treatment to cost more than the value of the object. In many cases for damaged paper stereo transparencies, the best conservation plan will be to organize good storage conditions, which will minimize physical stress to these objects during handling.

In this project, treatments were performed for the purpose of understanding these objects and the materials involved, with the idea that some might be recommended for conservation proposals in the future. Also, this experience could be of potential use in the conservation of other traditional optical toys and novelties on paper support, such as megalethoscopes, panorama panotiques, and portable dioramas.

Exhibition Issues of French Tissue Stereo Transparencies

Exhibition is a very important issue for this kind of photographic format. The beauty of these objects can only be completely appreciated by exhibition with transmitted light. Historically, French tissues were exhibited in special device called a "Brewster viewer," which was designed to use both reflected and transmitted light. In these viewers a mirror, or lead foil were used to direct natural light to the front or through the reverse side of the stereo card. These Brewster viewers are very rare today, making it difficult to properly exhibit French tissues. Without a historical viewer there are several ways to display this photographic format:

1. A new viewer based on the historical design can be constructed. This can be expensive, but it is the best way to see the image in 3-D.
2. Display the stereo view with transmitted light using a miniature light table.

Light deterioration is a major concern during exhibition. (With a light table, heat is an issue also.) To understand how the albumen and watercolor react to light, especially in exhibition environments where samples may be displayed for as short as just a few weeks or as long as over a year, a light test was proposed. One French tissue in good condition was chosen for testing.

LIGHT TESTING

Light plays a very important role in the determination of the overall useful life of photographic images given its contribution to the photo-degradation of the imaged area (albumen print), the colored area (watercolors), and the staining of the substrate the image is printed on.

In order to better understand the effects of light on French tissues, especially considering exhibition environment where samples may be displayed for as short as just a few weeks or as long as over a year, an accelerated light test was conducted on an original French tissue sample (already deteriorated), using cool white fluorescent light (7 kilolux) for a period of 96 days, at 70°F ±5°F and 50% RH ±5%. The samples were glass protected for two different reasons: to remove a section of the UV radiation (most damaging portion of the spectrum) and to more closely simulate the exhibition and viewing environment of the French tissues (understanding that the actual conditions may greatly vary depending on institutional specifications, and other factors).

Fig. 1. Samples prepared for light testing.

Fig. 2. Samples mounted in light-testing apparatus.

Fig. 3. Albumen side of samples after testing.

Fig. 4. Watercolor side of samples after testing.

***Note:** The year prediction is dependent on the initial assumptions of the test. Therefore by varying the initial assumption, the year prediction itself (how long a material lasts before the amount of degradation becomes unacceptable) will vary accordingly. Illumination levels in museums and other institutions vary greatly around the world, and even within same areas. Therefore, the task of choosing a light intensity, which is a good representative of most museums and institutions, is almost impossible. For the present test, it was assumed that a normal exhibition illumination may be 100 lux, and this value was used to estimate the approximate value of simulated years.*

The French tissue was analyzed based on density change in different areas of the sample (no end-points are defined for this kind of material). Regarding the Dmin area of the sample, the Image Permanence Institute (IPI) uses the "1/2 stain + media" correction method. This method assumes that changes in minimum density, measured in Dmin patches, occurred equally at all density levels. Therefore, in order to determine accurately the amount of image loss suffered by the sample during testing, it is necessary to take the change in Dmin into account.

The tested material was measured in Status A visual, red, green, and blue density using a GretagMacbeth SpectroScan spectrophotometer and Cielab data (D65 illuminant, 2º observer) before testing and at the following intervals: 1 day, 2 days, 3 days, 7 days, 8 days, 12 days, 14, days, 21 days, 31 days, 38 days, 52 days, 66 days and 96 days. In density mode, this device conforms to ANSI/NAPM Standard IT2.17-1995, ANSI/NAPM Standard IT2.18-1996, ANSI/NAPM Standard IT2.19-1994, ISO Standard 5-4:1995, ISO Standard 5-3:1995, and ISO Standard 5-2:1991. Sample was read in ANSI/ISO Status A visual, red, green, and blue as recommended in ANSI/NAPM Standard IT2.18-1996 and ISO Standard 5-3:1995.(see appendix #2).

Samples were backed with a non-reactive and non-yellowing white material (100% cotton cellulose, 4-ply white mount board).

Different light intensity values are found in galleries and museums (exhibitions). Due to these differences, it was difficult to design an accelerated light test that represents all exhibition conditions. It was necessary to create a framework of how time in the light-fading unit relates with the real exhibition time.

RESULTS

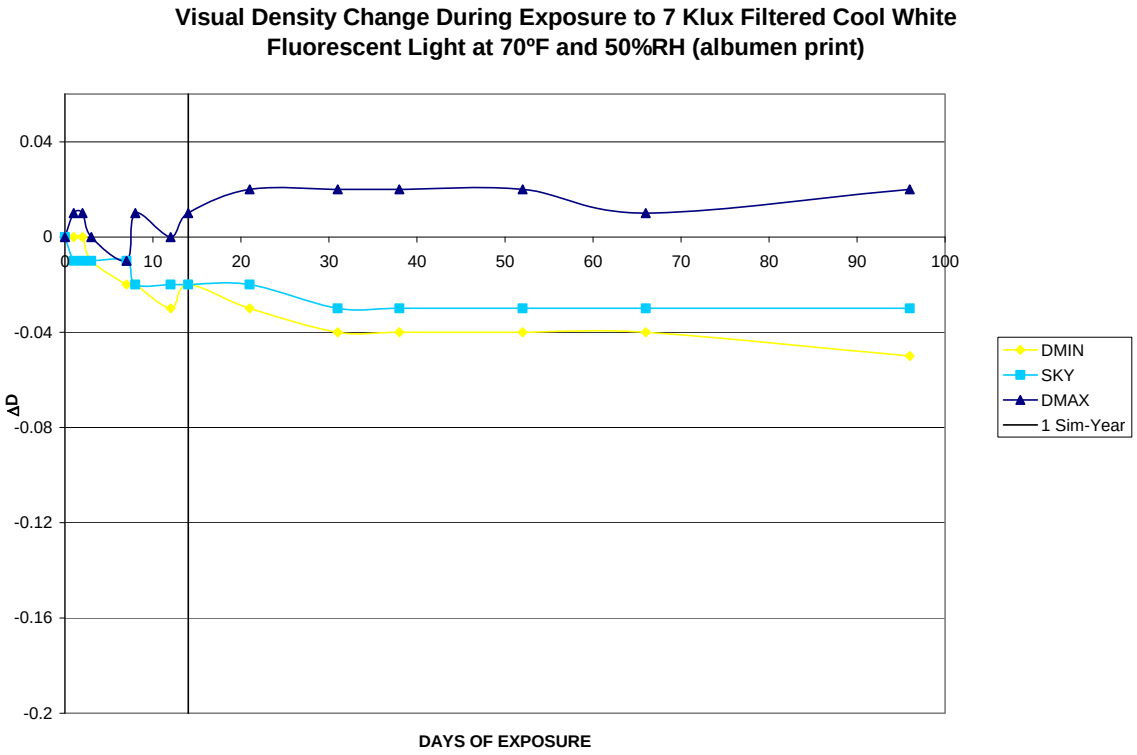
Albumen Side

It was difficult to find an albumen print with the same level of density and degree of fading on both left and right sides of the stereo. It was also difficult to find matching areas on both sides in which to do the density measurements, especially in Dmax.

Fig. 5. PST for light test in reflected light.

Fig. 6. PST for light test in transmitted light.

Fig. 7. PST for light test in reflected light after disassembly.

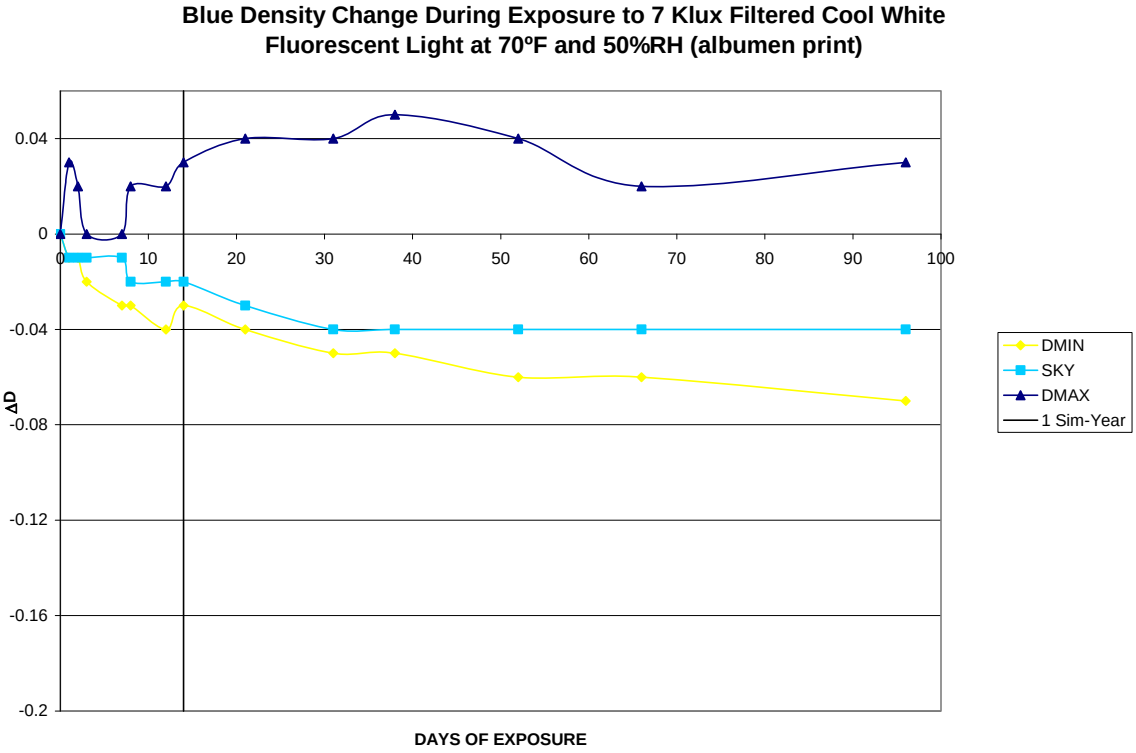


Visually:

- Dmin and sky areas looked lighter.
- Dmax did not exhibit any change.

Quantitatively:

- Dmin and sky both lost overall visual density, agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- Dmax seemed to show a slight change in the visual channel (gain). However, these data were not within instrument's margin of error and thus were not reliable.

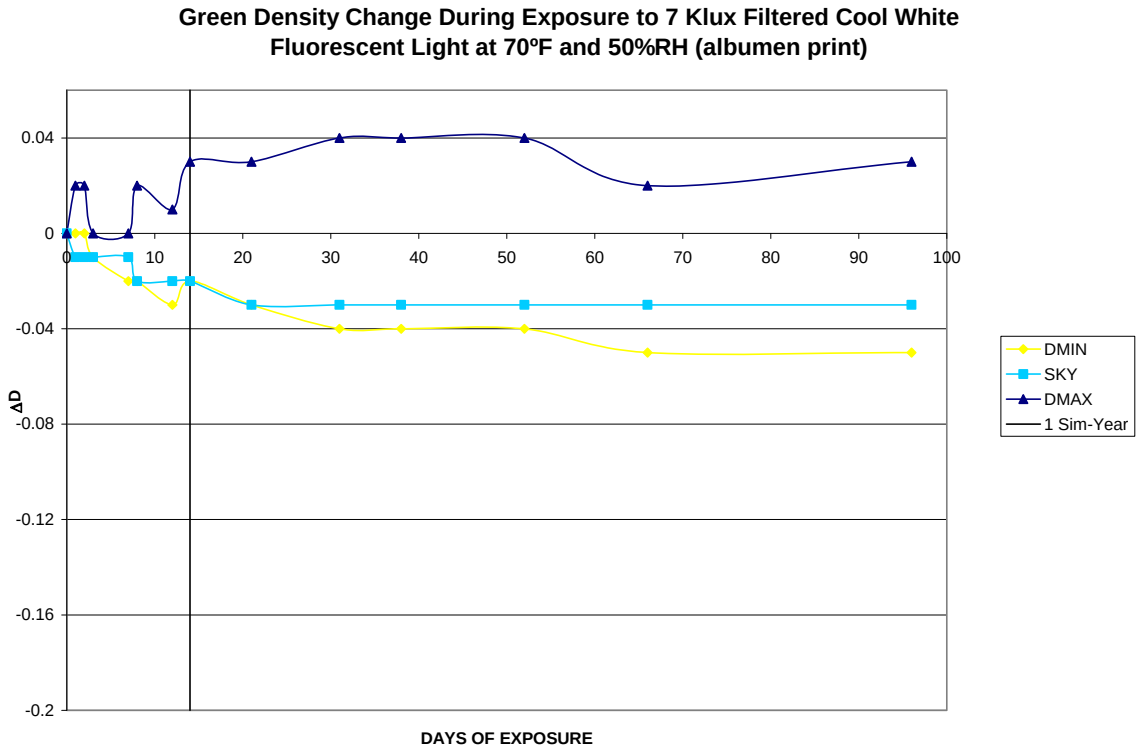


Visually:

- Dmin and sky areas looked slightly bleached.
- Dmax did not exhibit any change.

Quantitatively:

- Dmin and sky both lost overall blue density (yellow), agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- Dmax seemed to show a slight change in the blue channel (gain). Although part of the curve is within the measurable range, it is unlikely that this represents an actual gain of blue density. That this behavior may be attributed to the fact that, given the complexities of the images, it was really hard to find a very good Dmax area. And although great care was taken with each measurement, it is possible that the densitometer was reading different areas and therefore getting different readings.

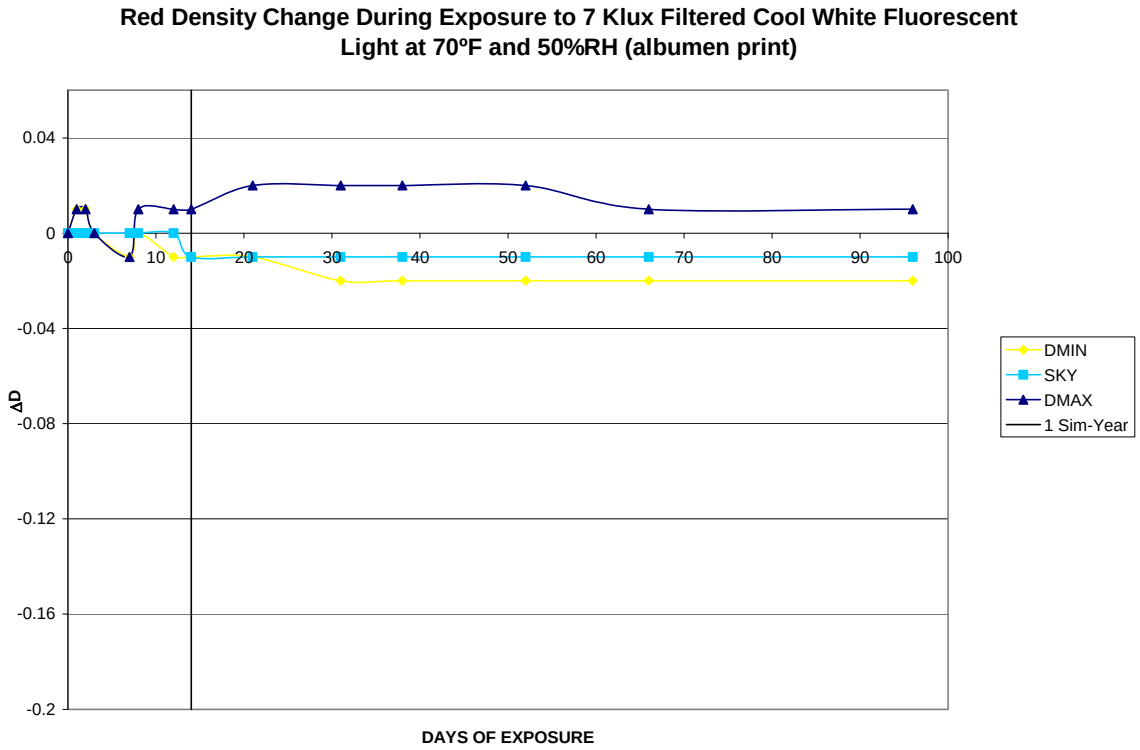


Visually:

- Dmin and sky areas looked slightly bleached (less red).
- Dmax, did not exhibit any change.

Quantitatively:

- Dmin and sky both lost overall green density (magenta), agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- Dmax seemed to show a slight change in the green channel (gain). Although part of the curve is within the measurable range, it is not likely that this represents an actual gain of blue density. This behavior can be attributed to the fact that, given the complexities of the images, it was hard to find a good Dmax area. And although great care was taken when measuring each time, it is possible that the densitometer was reading different areas, and therefore getting different readings.



Visually and Quantitatively:

- The albumen prints have the characteristic of presenting an overall reddish-brown colorcast. Most of the changes observed in this sample affected mostly the reddish appearance (after exposure the image looked less red), meaning that the blue and green densities were most affected. The red channel did not exhibit much change. Furthermore, all the measured changes in this channel fall below the instrument's margin of error, and therefore it is not reliable.

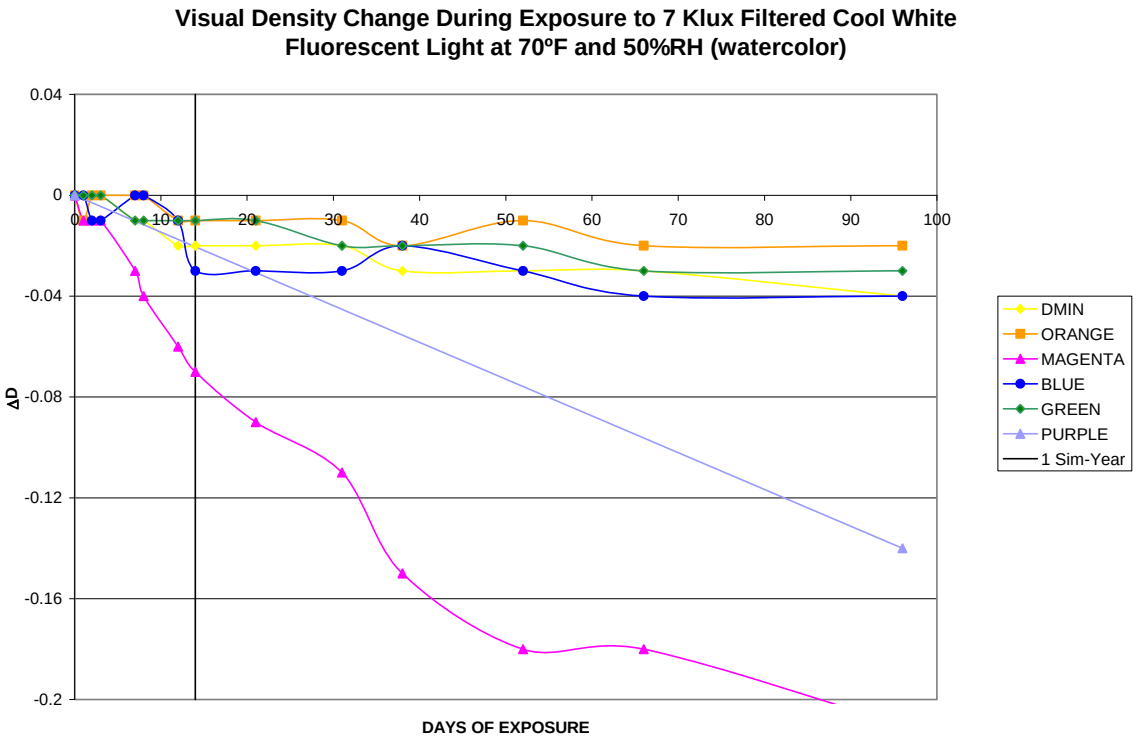
There was a difference in density after 96 days of light exposure. A bleaching effect was visually recognizable in fluorescent light.

Fig. 8. Image B (right) was exposed to light. Image Bu (left) was the unexposed control.

WATERCOLOR

It was difficult to choose an albumen print, which had watercolor painting on the back that had the same density and range of colors on both right and left sides of the stereo. The example that was chosen had typical pigments and dyes for PSTs.

Fig. 9. Watercolor side of albumen print after disassembly.



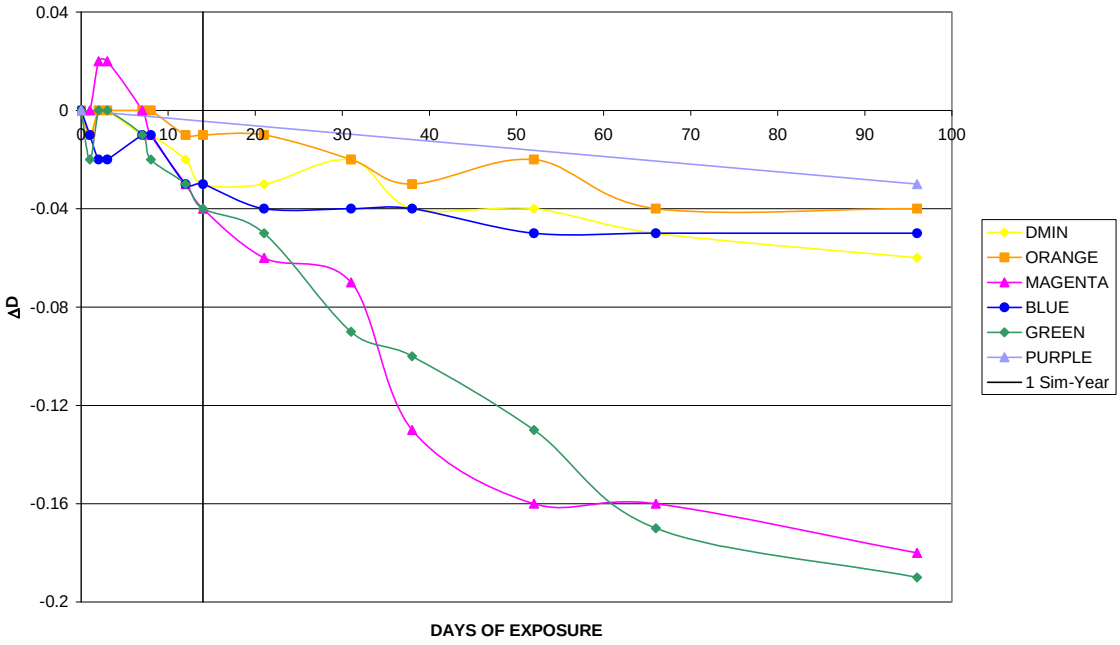
Visually:

- Dmin and most color areas looked lighter (with the exception of the orange).

Quantitatively:

- Dmin and most color areas lost overall visual density, agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- The magenta and the purple colors were the most affected.

Blue Density Change During Exposure to 7 Klux Filtered Cool White Fluorescent Light at 70ºF and 50%RH (watercolor)

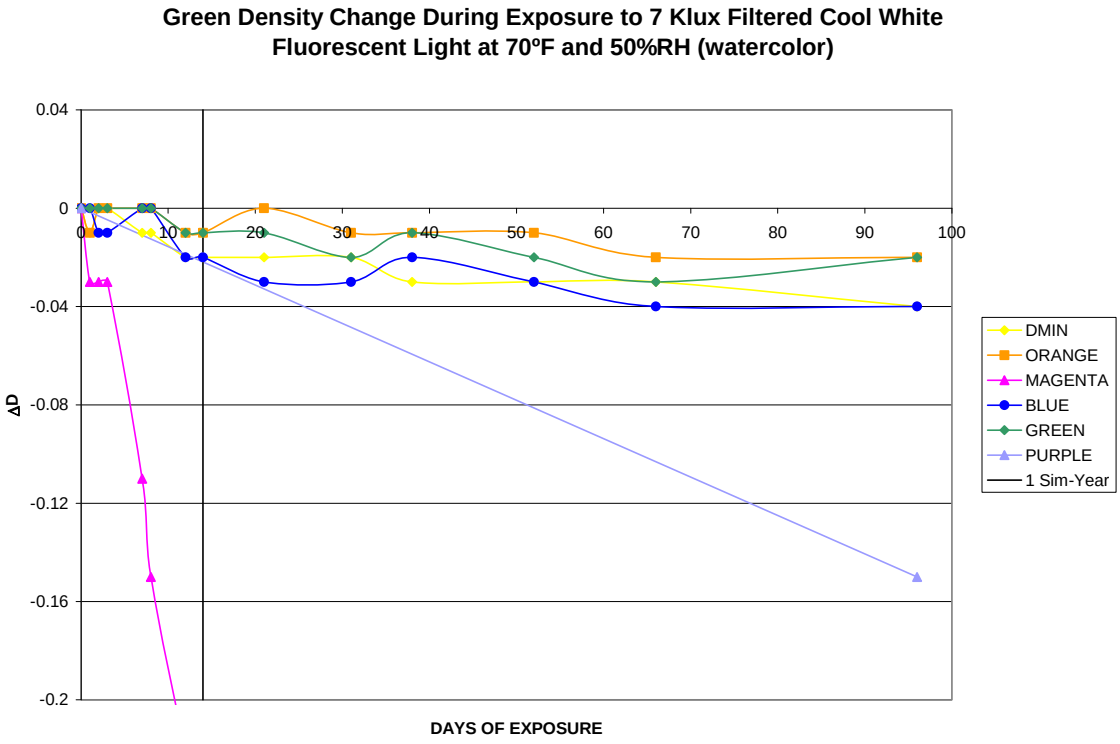


Visually:

- Dmin and all color areas looked lighter (less yellow).
- The green looked much more blue (it did not look lighter).

Quantitatively:

- Dmin and most color areas lost overall visual density, agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- The magenta and the green colors were the most affected.

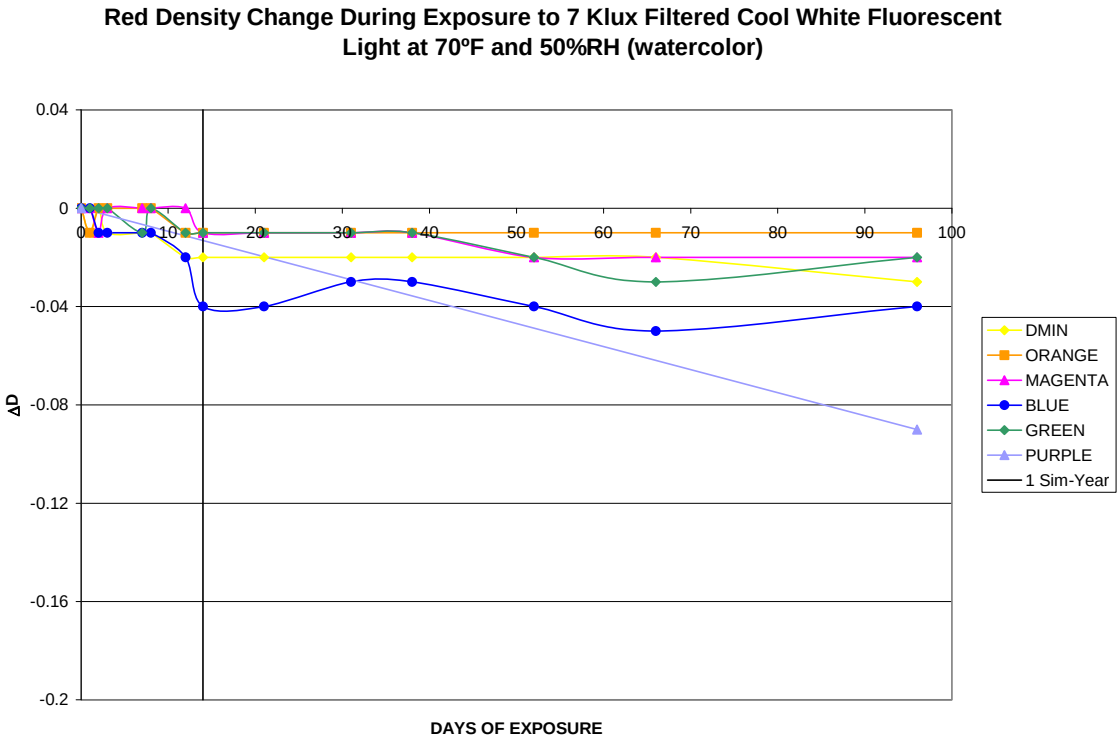


Visually:

- Dmin and most color areas looked lighter (with the exception of the orange).
- The magenta looked more yellow and orange. Much of the magenta content was lost.

Quantitatively:

- Dmin and most color areas lost overall visual density, agreeing with the visual observations. The measured change was within the instrument's margin of error, and thus the data were reliable.
- The magenta (Δ-0.7). and the purple colors were the most affected.
- The purple lost a lot of its magenta content.



Visually:

- Dmin and most color areas looked lighter (with the exception of the orange).

Quantitatively:

- The purple and the blue colors were the most affected, especially the purple.
- The other colors were not really affected in this channel.

Conclusion

The red color (madder red pigment) looked much lighter and more orange. Madder red pigment is unstable to light.

Fig. 10. Image on left shows faded madder red after testing. Image on right is unexposed control.

The yellow color (gamboge pigment) was very faded. .Gamboge pigment is very unstable to light.

The green color (hooker's green mixture of Prussian blue and gamboge) shifted to blue, because the gamboge (yellow) disappeared completely

Fig. 11. Image on left shows faded gamboge. Image on right is unexposed control.

The purple color (madder purple pigment) faded as a result of light testing on the albumen side of the sample. The light was transmitted through the front and was reflected off the mat board backing, fading the watercolor on the back of the sample.

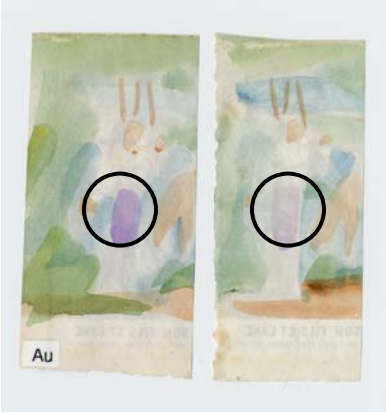


Fig. 12. Image on right shows faded purple color. Image on left is unexposed control.

Because paper objects are highly light-sensitive, guidelines for limiting exposure are desirable. A limit of 50,000 lux hours has been suggested for very light-sensitive materials.[*] For example, if the object is displayed for ten hours a day at 50 lux, the limit is reached in 100 days.

[*] Glaser M.T., "Protecting paper and book collections during exhibition', Preservation of Library & Archival Materials: a Manual, third edition, NEDCC, 1999,p.113.

Paper stereo transparencies are very light sensitive (especially watercolor painting from the back of the albumen print), it is reasonable to recognize them as a highly light sensitive paper objects. All exhibition recommendations for this kind of objects could be applied on PSTs.

This light test shows that the watercolor is more sensitive to the light than the albumen print. From my experience looking at different collections I have observed that many albumen prints of French tissues are faded. But strangely enough the watercolor or aniline dye painting is almost always very bright and colorful. This suggests that French Tissues were not exposed to light that as much as we previously thought; especially since the light would be coming from the watercolor side of the French Tissue in order to create the appearance of color. Because environmental conditions are known to affect the fading of albumen prints, it is likely that many of the French Tissues I observed were faded because they were stored in poor environments, and not that they were excessively used.

Special binders with polyester envelopes will be recommended for storage housing instead of common boxes.

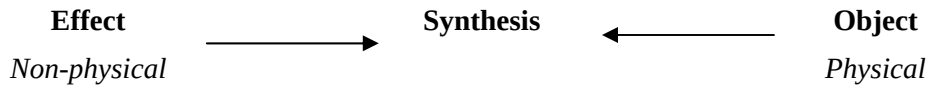
Fig.13.Special binder with polyester envelopes for keeping PSTs in Musee Carnavalet in Paris

Conclusion

Complex structure, unique meaning and original idea a**re** the three factors to be considered in making a decision about the level of conservation intervention. The question is: what should be given priority in the treatment of French tissues: the albumen print, or the watercolor painting, or the physical sandwich with four layers? Is it more important to preserve the object itself, or is it advisable to preserve the most essential part of the object? What is essence, the essential quality or overall impact of paper stereo transparencies?
During this project I had a chance to find some answers to these questions.

The goal of conservator is to preserve the essence of French tissues

The essence is THE EFFECT, DEPENDENT UPON THE



The "RAISON D ETRE" of these objects IS THE EXPERIENCE of the viewer

FIRST STAGE IS BEAUTY:

When one sees French tissue as an object in reflected light without a viewer. It is a lovely, beautiful paper novelty.

SECOND STAGE IS SURPRISE:

It is the experience of seeing this transformation from a monochrome two-dimensional image to three-dimensional image in color, using a viewing device. It is an even greater surprise effect, when it is not just a change in color but in the scene or elements of the scene also.

THE MYSTERY OF EFFECT:

When one comes back to the monochrome stereo card, consists of four paper layers, pasted together, one might marvel at how this tiny object could play this big trick on you. Now you can see this object with a new appreciation.

The main task of conservator is to preserve the idea, the essence and the overall philosophy of PST's. Working with this understanding a paper conservator should treat it as well as a photo conservator.

Some French Tissue Stereo Transparency Private Collections

In Paris

Three private collectors hold the majority of French tissues in Paris.

Pierre Tavlitsky owns the largest collection of stereo cards in France (more than 70,000 items). This collector does not know exactly how many French tissue stereo cards he has a typical situation, because usually French tissue stereos exist as part of regular stereo card collections. This way of collecting is common; all stereo cards are informative objects, and they are usually collected by topic.

Pierre Tavlitsky has collected stereo cards since 1986. He not only collects the photographs, but he also does a great deal of research on them. He was once the president of the European region NSA (National Stereo Assosiation). His collection of paper stereo transparency is unique because it contains some very early examples of this photographic format.

I had the chance to see many of the earliest French tissues from his collection. He prepared this material chronologically and showed me sets of stereo cards and tissues showing the same topics. Some of the tissues and stereo cards were made from the same negative. Pierre is doing research about dates for earliest French tissues, which are not yet established. Pierre generously donated some PSTs from his collection for this project. He also kindly participated in creating the short history of Paper Stereo Transparencies.

Fig. 1. Pierre Tavlitsky.

Fig. 2. Part of the Tavlitsky collection.

Fig. 3. Denis Pellerin . . .

The second collector that I visited in Paris was Denis Pellerin. He is the author of *La photographie stereoscopique sous le second*

Empire, the bible for all stereo collectors. This visit proved to be very important, because it was here I realized that nobody was doing any historical or conservation research on French tissue stereo transparencies. Denis Pellerin is a teacher who has been researching stereos for more than 15 years. He has an excellent collection of French tissues and very large collection of stereo cards. The focus of his French tissue collection is complete sets with the original boxes. Many of these sets are in very good condition and are very early editions.

Fig. 4. Francis Dupin holding a sample from his collection.

Denis Pellerin was the historical advisor of this project. He donated beautiful examples from his collection for this project.

Finally, I visited Francis Dupin's collection in Paris. Mr. Dupin has been collecting stereos for about seven years. His French tissue collection is not very large, but he has examples of very early salted prints in very good condition. I was able to introduce Francis to Pierre Tavlitsky. They plan to publish an article about the earliest French tissue stereo cards. They found that the first tissues were done not much later than 1853. They concluded this by comparing views of Notre Dame Bridge, which is represented in a salted paper print from the Pierre Tavlitsky collection. The bridge was pulled down in 1853 and replaced by a new one. This view shows the old bridge, indicating that the negative was taken before June 1853, as the print, which on salted paper, and the style of the cardboard, definitely the view has been edited at the same time, no later. [This needs to be clarified a bit.] A view from the Francis Dupin collection might have the same date, because it has exactly the same characteristics.

The result of this trip to Paris was a deeper understanding of the nature of early French tissues, more precise dates in the chronological development of French tissues, and a more accurate assessment of the general condition of French tissues. Pierre Tavlitsky, Denis Pellerin, and Francis Dupin were most generous in sharing their knowledge of French tissues, discussing their collections, and providing several examples for examination and treatment.

IN THE UNITED STATES

Tex Treadwell had the largest private collection of PSTs in the USA. His collection, now held at the Institute for Photographic Research in [provide city], Texas, totals 4,029 items, which were acquired between 1960 and 2002, without emphasis on any particular topic. Because he was ill, Mr. Treadwell was never able to meet with the author, but he was very generous in his correspondence, even while he was in the hospital. Tex Treadwell and Joleeta, his wife, supported this project by providing samples of damaged PSTs and some very useful information about stereo cards. He also kindly offered some corrections to the history section of this report. Tex Treadwell died in Spring 2003

List of PST's with different levels of deterioration from GEH collection

BOX 1 -210 ITEMS

1. 78:0951:54 – hole on a tissue
2. 78:0951:56 – very faded
3. 70:128:5 – foxing, broken tissue
4. 70:128:13 – tears, foxing, exfoliation
5. 78:0946:1 - tears
6. 78:0946:5 –broken albumen print, cockling
7. 78:0946:6 – tears on albumen
8. 78:0948:2 - fingerprints
9. 78:0948:5 - foxing
10. 78:0948:7 - foxing
11. 78:0948:14 – foxing, cockling
12. 78:0948:30 - hole
13. 78:0948:33 - cockling
14. 78:0948:36 – cockling, foxing
15. 78:0948:28 – cockling, yellowing of tissue
16. 78:0951:1 - foxing
17. 78:0951:2 – foxing, hole
18. 78:0951:6 - foxing
19. 78:0951:9 –, foxing
20. 78:0951:10 –, foxing on albumen
21. 78:0951:11 – folders on albumen print
22. 78:0951:16 – brown stains
23. 78:0951:18 –foxing
24. 78:0951:22 – pinch hole
25. 78:0951:25 - foxing
26. 78:0951:30 - foxing
27. 78:0951:31 - dirty
28. 78:0951:32 - foxing
29. 78:0951:33 – foxing
30. 78:0951:36 – broken mat from the back, yellow stains on albumen side
31. 78:0951:43 –cockling, dirty from the back
32. 78:0951:47 – broken albumen and tissue
33. 78:095:57 - faded
34. 78:0951:58 - foxing
35. 78:0951:60 – foxing
36. 78:0951:61 – yellow stains on albumen
37. 78:0951:66 – yellow stains
38. 79:1698:1 – tear on a tissue
39. 40.79:1698:7 - foxing
40. 79:1698:14 – yellow stains on albumen
41. 79:1698:17 – cockling albumen
42. 79:1698:18 - albumen loss
43. 79:1698:23 - foxing
44. 79:1698:24 - foxing

45. 79:1698:25 - yellow stains on albumen
46. 79:1698:30 - foxing
47. 79:1698:37 - foxing
48. 79:1698:39 - foxing
49. 81:9646:1 - yellow stains on albumen
50. 81:9648:4 - very deteriorated, no back, big holes, from the back – pieces of gelatin
51. 81:9648:2 - hole
52. 81:9648:12 - foxing
53. 81:9649:2 - foxing
54. 81:9649 - big holes on the right part
55. 81:9650:3 - cockling, strong cracking
56. 81:9651:3 - very strong deformation, cracking
57. 81:9651:8 - yellowing of albumen, strong foxing from the back
58. 81:9651:10 - holes, yellow stains

Box 2 – 199 items.

59. 81:9680:1 – mechanical damage of tissue, the frame has green oxidation
60. 79:3566:1 – holes and losses
61. 81:9625:1 – tear on tissue
62. 81:9625:2 - hole
63. 81:9625:3 - foxing
64. 81:9625:5 – hole, yellow stains
65. 81:9626:1 – cockling, yellow stains, tear on tissue
66. 81:9628:1 – strong cracks, yellowing, cockling
67. 81:9231:1 – yellow stains on the tissue
68. 81:9632:1 – yellow stains (recto and verso)
69. 81:9632:2 – hole on the right side
70. 81:9632:3 – very dirty, yellow stains on the tissue
71. 81:9632 – yellow stains on the tissue
72. 8181:9632:5 – very dirty, yellow stains on the tissue
73. 81:9632:6 – foxing (mostly recto, some verso)
74. 81:9632:7 – dark stain on the right part, tear on the tissue
75. 81:9632:8 – hole on the right part, tears on the tissue
76. 81:9633:1 – foxing from the back
77. 81:9635:1 – tears on the right side, the tissue is completely destroyed (foxing losses)
78. 81:9635:4 – dirty, lots of foxing on the tissue
79. 81:9635:5 – tears and holes on the right part, foxing on the tissue
80. 81:9635:6 – big dark stain on the tissue
81. 81:9635:7 – some conservation was done
82. 81:9635:8 – tears on the left part mended with a wrong glue
83. 81:9635:9 – foxing on the tissue
84. 81:9635:10 – tear, holes, lots of foxing on the tissue
85. 81:9635:11 – losses and glue on the tissue
86. 81:9635:16 – tears, foxing on the tissue (verso, recto)
87. 81:9635:17 – foxing on the tissue
88. 81:9636:2 – foxing on albumen
89. 81:9637:1 – tear on the right part
90. 81:9637:2 – tears with scotch on recto

91. 81:9637:3 – yellow stains on the tissue
92. 81:9637:4 – very yellow, tears on the tissue
93. 81:9637:5 – very dirty
94. 81:9638:3 – some foxing on the tissue
95. 81:9638:4 – some foxing
96. 81:9638:5 – very dirty
97. 81:9638:6 – frame is broken – tears as a result of this
98. 82:1569:1 – some foxing on the tissue
99. 81:9697:1 - tears
100. 81:9709:1 – tears on the right part
101. 70:128:17 – tears on the left part
102. 81:9638:1 – big tears
103. 78:0949:9 – foxing on the tissue, yellowing
104. 78:0949:10 – foxing, yellowing
105. 70:128:7 – hole on the right part, some losses on the tissue
106. 70:128:12 – some foxing on the tissue
107. 81:9673:2 – some tears and brown stains on the tissue
108. 81:9675:1 – yellowing, tears, some foxing
109. 81:9676:2 – some tears on tissue
110. 819676:5 – tears, yellow stains, some foxing
111. 81:9676:7 – tear on the right part, tears on the tissue
112. 81:9676:8 – no tissue, no frame back
113. 81:9676:9 – some tissue deterioration
114. 81:9677:2 – some tears and foxing on the tissue
115. 81:9677:3 – brown stains on the tissue
116. 81:9677:5 – some foxing on the tissue
117. 81:9677:8 – tears on the right part
118. 81:9677:9 – tears
119. 819677:10 – yellow stains on the tissue
120. 81:9679:1 - foxing
121. 81:9678:2 – yellow stains on tissue
122. 81:9679:3 - foxing
123. 81:9679:7 – no tissue
124. 81:9679:8 – very strong brown stains (foxing)
125. 81:9679:9 – brown stains
126. 81:9679:10 – brown stains
127. 86:950:8 – tears, foxing
128. 81:9700:2 – tear on the left side, foxing
129. 81:9710:2 – tear, foxing on the tissue
130. 81:9713:1 – tear and foxing on photograph
131. 81:9713:2 – faded, yellow, tears on the left part
132. 81:9713:4 – yellow, stains on the tissue
133. 81:9713:5 – tears on the left part, some foxing on the tissue
134. 81:9713:6 – yellow, faded, some foxing on the tissue
135. 81:9713:7 – tissue is very yellow
136. 81:9713:8 – tears on the bottom part
137. 81:97113:9 – yellowing on tissue (probably from a yellow (colored) mat)
138. 70:128:11 – blue tissue has discolored stains (foxing), tear on the left side
139. 81:9698:1 – tear on the right part, brown stains on the tissue
140. 81:9716:1 – some tears on the tissue
141. 78:0949:1 – very dirty, tear on the left part, frame is falling on parts

142. 81:9640:1 – tear on the left part, tape on tissue
143. 81:9678:6 – tear on the right part
144. 81:9645:2 – very dirty tissue, tears
145. 81:9643:2 – foxing on the tissue
146. 78:0949:7 – tear on the right part
147. 81:9703:1 – very dirty tissue, tears
148. 81:9690:1 – foxing on the tissue
149. 81:9704:1 – tear on the right part
150. 81:9691:1 – tear on the left part, foxing on the tissue
151. 81:9692:1 – very dirty, tear and brown stains on the tissue
152. 81:9639:1 – tears and some repairs
153. 81:9639:02 – some tears on the tissue, tissue is very yellow
154. 81:9639:3 – tears, some repairs also on the albumen side (scotch)
155. 81:9693:4 – big brown stains, especially from the back
156. 81:9639:8 – big tear on the left side
157. 81:9693:11 – big tear on the left side

Box 3 – 100 items

158. 81:9653:1 – brown stains, especially from the back
159. 81:9653:3 – foxing on the tissue
160. 81:9653:4 – very faded, very dirty, tears from the left side, some repairs on the tissue with cellophane
161. 81:9655:1 – brown stains and some tears on the tissue
162. 81:9657:1 – brown accretion on the left side, the tissue is very yellow
163. 81:9659:1 – it is not tissue stereo, gelatin, very pink, tears on the left side, the frame is destroyed
164. 81:9659:2 – gelatin, stains on the back side
165. 81:9660:1 – very dirty, not albumen, gelatin, some repairs, from the back – lots of brown stains, no tissue
166. 81:9660 – gelatin, no tissue, lots of stains from the back
167. 81:9660:3 – gelatin, no tissue
168. 81:9660:3 – gelatin, no tissue, lots of brown stains from the back
169. 81:9661:1 – tear on the right part, brown stain in the same place on the tissue
170. 81:9662:1 – brown stain on the tissue
171. 81:9664:1 – some yellow stains on the tissue
172. 81:9665:1 – hand-colored albumen, no tissue
173. 81:9669:2 – no tissue from the beginning
174. 81:9670:1 – no tissue from the beginning
175. 81:9671:1 – hand-colored albumen, tears on the tissue, tear on the left part of photograph
176. 81:9681:1 – tears on the tissue
177. 81:9684:1 – very faded albumen, tears on the left part
178. 81:9686:1 – tears, lost tissue
179. 81:9687:1 – tinted albumen
180. 81:9688:1 – tear on the tissue
181. 81:9693:2 – no face frame part
182. 83:261:1 – foxing on the tissue
183. 85:1404:2 – tear on the left side, brown, mostly on the tissue
184. 85:1404:3 – brown stain on the left side
185. 85:1404 – brown stains on the tissue
186. 85:1404:5 – brown stains on albumen and tissue (same place)
187. 85:1404:10 – lots of foxing on the tissue
188. 85:1404:12 – brown stains on the tissue
189. 85:1404:14 – foxing on the tissue
190. 85:1404:16 – foxing on the tissue
191. 85:1404:18 - brown stains on the left side
192. 85:1404:19 – brown stains on the left side
193. 85:1404:21 – some brown stains on the tissue
194. 85:1404:22 – brown stains on the tissue
195. 85:1404:25 – brown stain on the left side
196. 85:1404:28 – some brown stains on the tissue
197. 85:1404:30 – small holes on the tissue
198. 85:1404:31 – blue stains (media) on albumen, a big brown stain on the tissue
199. 85:1404:32 – brown stains on the tissue
200. 85:1404:33 – brown stains on the tissue
201. 85:1404:35 – brown stains on the tissue

202. 85:1404:37 – some brown stains on the tissue
203. 85:1404:38 – little tear on the right side
204. 85:1404:45 – tears and some brown stains on the right side
205. 86:950:6 – some hand-coloring, tears on the left side
206. 88:711:1 – big tear on the right side, brown stains on the tissue

TABLE OF EQUIVALENT TIME (SIMULATED YEARS):
They are calculated based on different museum lighting conditions

ACTUAL CONDITIONS			INITIAL ASSUMPTIONS			
			LIGHT INTENSITY (in lux)			HOURS per DAY
			60	100	120	8
LIGHT INTENSITY (in lux)	HOURS per DAY	DAYS	SIMULATED YEARS			
7000	24	1	0.96	0.58	0.48	
7000	24	2	1.92	1.15	0.96	
7000	24	3	2.88	1.73	1.44	
7000	24	7	6.71	4.03	3.36	
7000	24	8	7.67	4.60	3.84	
7000	24	12	11.51	6.90	5.75	
7000	24	14	13.42	8.05	6.71	
7000	24	21	20.14	12.08	10.07	
7000	24	31	29.73	17.84	14.86	
7000	24	38	36.44	21.86	18.22	
7000	24	52	49.86	29.92	24.93	
7000	24	66	63.29	37.97	31.64	
7000	24	96	92.05	55.23	46.03	

ACTUAL CONDITIONS				
LIGHT INTENSITY (in lux)	HOURS per DAY	DAYS	HOURS	CUMULATIVE EXPOSURE (LUX.HOURS)
7000	24	1	24	168,000
7000	24	2	48	336,000
7000	24	3	72	504,000
7000	24	7	168	1,176,000
7000	24	8	192	1,344,000
7000	24	12	288	2,016,000
7000	24	14	336	2,352,000
7000	24	21	504	3,528,000
7000	24	31	744	5,208,000
7000	24	38	912	6,384,000
7000	24	52	1248	8,736,000
7000	24	66	1584	11,088,000
7000	24	96	2304	16,128,000

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