

# Document and Photo Preservation Workshop

Kate Legg, Certified Archivist

Loveland Public Library

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## WORKSHOP SCHEDULE

- 9:00-9:50    PART 1  
Identifying Historic Photographs and Negatives  
Research Strategies  
Photograph Dating Exercise
- 9:50-10:00    Break
- 10:00-10:50    PART 2  
Care and Handling  
Preservation of Photographs and Negatives  
Preservation of Paper Documents  
Preservation of Scrapbooks
- 10:50-11:00    Break
- 11:00-11:30    PART 3  
Digitization and Digital Preservation  
Disaster Preparedness
- 11:30-12:00    Questions

# **Document and Photo Preservation Workshop: Further Reading**

## **Table of Contents**

The Carte-de-Visite Craze

Dating Card Mounted Photographs

NEDCC: Resources for Private and Family Collections

NEDCC: A Short Guide to Film Based Photographic Materials

Center for Southwest Studies: Photonegatives Identification Tips

A Rough Guide to Preserving Document and Scrapbook Materials

AIC: Caring For Your Treasures--Books

NEDCC: Emergency Salvage of Wet Photographs

NEDCC: Emergency Salvage of Moldy Books and Paper

Resource List

## The carte-de-visite craze

Here is a little history lesson, which I hope will explain why I enjoy these artefacts.

### What is a carte-de-visite?

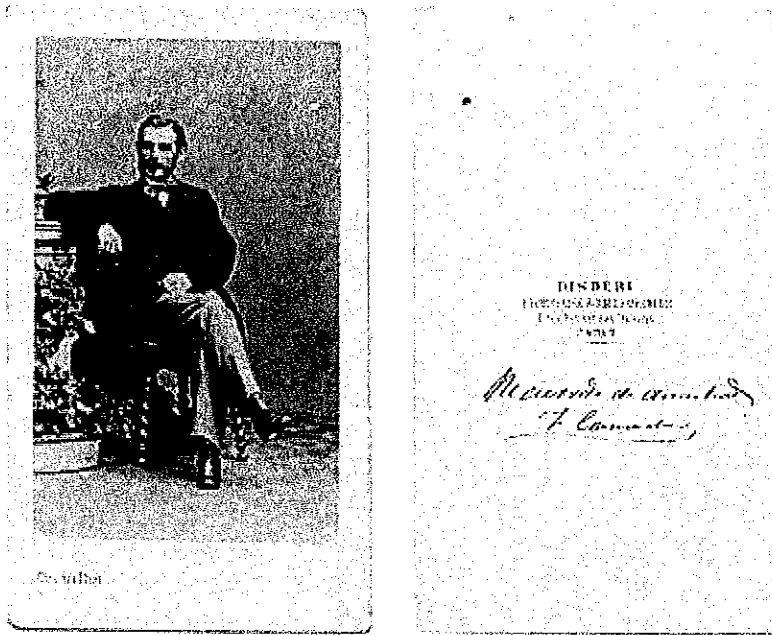
It's a small black and white photo stuck to a card. It was invented in the 1850s, became a world-wide craze soon after, and faded away by the 1890s. Holding one of these little cards evokes the Victorian world's social quirks and technological inventiveness.



Nineteenth century carte-de-visite by S H Farnham, Oxford, New York, with a modern credit card.

### Invention

In November of 1854, the French photographer André Disdéri (<http://www.getty.edu/art/gettyguide/artMakerDetails?maker=2075>) introduced a method for producing multiple images on a single glass plate, a format for mounting the resulting images on cards, and the name *carte-de-visite* to describe the product. His invention caught on, and photographers around the world made it a lucrative business.



Front and back of a carte-de-visite by the Disdéri studio, circa 1865-75. The handwriting on the back says *recuerdo de amistad: J Camacho* [Spanish for *memory of friendship: J Camacho*]. The subject may be a Portuguese photographer called João Francisco Camacho (1833-1898) who studied photography in France with Disdéri.

## The business

The carte-de-visite business needed capital, technical skills, marketing savvy, specialised materials, cultural acceptance, and customer demand — in short, it was a system. It worked like this:

**Promotion** brought clients to the photographer. Posters, newspaper advertisements, a prominent studio and word-of-mouth brought clients to the door. In regions where the population was thinly dispersed (like rural Queensland) some photographers travelled in search of customers. These itinerant workers relied on newspaper advertising and, perhaps, a splash of showmanship to bring in the business.

Above: 1876 newspaper advertisement for the itinerant Queensland photographer James Boag. [Image scanned from Dianne Byrne's book *A travelling photographer in colonial Queensland: the work of William Boag* (Brisbane: State Library of Queensland, 1994)]

**The studio** was the place where it all came together. In established businesses, the photographer's studio was an elegant setting for efficiently photographing a succession of sitters, and selling them as many photographs and accessories as possible. Customers were received in a *waiting room*, tastefully decorated with examples of the studio's work. Sitters were then ushered into the *camera room* — a specially built room lit with skylights — where they were posed in front of the camera. They had to hold poses for several seconds, a feat made easier (if not more comfortable) by adjustable head clamps attached to

posing chairs. The camera room had a range of painted backdrops, furniture, drapery and props to impart the right atmosphere to the picture — perhaps rustic, perhaps genteel.

Above: Adjustable head clamp. [Image cropped from an illustration in *A popular treatise on photography*, from the Albumen photographs (<http://albumen.stanford.edu/library/monographs/monckh/chap08.html>) website]

**The wet plate negative** had to be sensitized before it was used in the camera. In this *collodion* process each glass plate was prepared in complete darkness, and exposed and developed while it was still wet. This complicated procedure was best done indoors in a properly set up darkroom. Travelling photographers resorted to horsedrawn vans, or lightproof tents. See the video *Making a wet collodion negative* on the Getty website ([http://www.getty.edu/art/collections/media\\_gallery.html](http://www.getty.edu/art/collections/media_gallery.html)) .

Above: Photographer preparing collodion plates in the darkroom. [Image from an illustration in *A popular treatise on photography*, from the Albumen photographs (<http://albumen.stanford.edu/library/monographs/monckh/chap05.html>) website]

**Multiple lens cameras** made several small images on each glass plate negative. This cut the cost per image and simplified the handling of the wet plates. The photographer could choose to expose the images one after the other, or all at once — one of the keys to efficiency in the carte-de-visite business.

Above: A wet plate carte-de-visite camera described and illustrated on Rob Niederman's website (<http://www.antiqwoodcameras.com/wetpl1.htm>) .

**Albumen prints** were made by contact printing the negatives. *Albumen paper* was made by coating each sheet with egg white. Yes, hens' eggs — in 1862 a British firm used half a million eggs per year for this. The coated paper was sensitized with silver compounds.

Above: Workers in an albumen paper factory breaking and separating eggs. [Part of an image from Josef Maria Eder's *Ausführliches handbuch der photographie* reproduced in a paper by J M Reilly (<http://albumen.stanford.edu/library/c20/reilly1978.html>) .]

**The card** on which the print was mounted displayed the name of the photographer on the front and back. The back was often a showy piece of lithographic printing, with the photographer's name decorated with curlicues. There was often a statement that extra prints could be ordered at any time, and sometimes the negative number was written on the back. A piece of tissue paper was glued on the back at the top, and folded over to protect the front of the print.

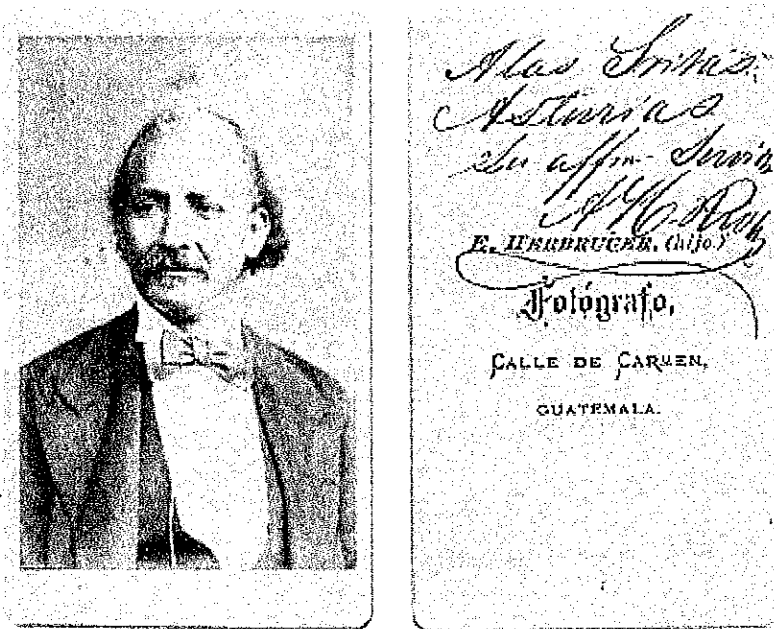
Above: Carte-de-visite of a girl, from the studio of Albert Lomer & Co ([cartes/cat\\_albert\\_lomer\\_co.html](cartes/cat_albert_lomer_co.html)) , Queen Street, Brisbane. Notice the small remnant of tissue paper at the top.

## The craze

Disdéri's invention was an immediate success.

*Just as there is no serious question about Disdéri's patent application, there is no doubt about his role in popularizing the carte de visite. An unverified story — no doubt embellished by tradition — relates how Napoleon III in 1859 en route with his troops to Italy, stopped at Disdéri's Paris studio to have his portrait taken. Seizing the opportunity to make a handsome profit, Disdéri sold thousands of copies. Almost overnight a new fad was born. The studios of Paris, not only Disdéri's, were besieged by patrons who wished to have their pictures taken in the new style. [William Darrah, *Cartes de visite in nineteenth century photography*]*

Ordinary people swarmed to the studios too. The little photographs were convenient to handle, sturdy, novel, and inexpensive. In an era of great social and economic change the new mode of photography spread from the metropolis to the hinterland. In the backblocks of Guatemala or Queensland, photographers set up their studios.



Front and back of a carte-de-visite from the Guatemalan studio of E Herbruger Jr, circa 1880. The Spanish inscription says (roughly translated) *To the ladies of the Asturias family, your beloved servant: A. M. Ruiz*. I got this photograph from the same source as the Disdéri one above.

### **After the carte-de-visite**

No craze lasts forever. The fad for cartes-de-visite faded in the 1880s, around the time George Eastman's Kodak camera was introduced. The Kodak slogan *you push the button — we do the rest* signalled the beginning of amateur photography for the masses.

### **More information**

*Cartes de visite in nineteenth century photography*, a book by William C Darrah (self published in Gettysburg, USA, in 1981), is a comprehensive account. It's out of print now, but you should be able to find a copy in a good reference library (<http://srlopac.slq.qld.gov.au/>).

Albumen photographs: history, science and preservation (<http://albumen.stanford.edu/>) , a Stanford University website about *...the art and science of albumen printing. The site brings together 19th Century technical instruction, contemporary research, an online forum for conservation treatment and a wealth of images.*

Early photographers of south east Queensland ([http://members.ozemail.com.au/~msafier/photos/southern\\_qld.html](http://members.ozemail.com.au/~msafier/photos/southern_qld.html)) , a website by photo historian Marcel Safier. He intends the site *...to chronicle the early photographers who worked in the various major towns of southern Queensland during the nineteenth century and up until around the end of the first World War.*

## DATING CARD MOUNTED PHOTOGRAPHS

<mailto:jrowe@vintagephoto.com>- HOME - Comments

Card mounted photographs from the 19th and early 20th century, such as cartes-de-visites, cabinet cards and stereographs can be generally dated by their format and mount type. Printed mount notations such as photographer's identification and title are fairly reliable, but can still provide false information.

Dating by mount type and style provides a rough indicator for identifying images. The caveat is that many photographers, particularly in more remote areas, failed to keep up to photographic fashion and used old mounts until their stocks were exhausted. Also, photographers reprinted historically or commercially important images long after they were originally taken. Also negatives were often sold or copied and the mount information may not accurately reflect the history of the images. For example, D. P. Flanders views of Prescott taken in the Spring of 1874 appear on Williscraft mounts in the late 1870s and Continent mounts into the mid 1880s.

Notations on the mounts can occasionally provide additional information about the image, but should always be verified by other sources before being relied on. Handwritten notations are the most suspect, often being added long after the image was made by persons with only secondary knowledge.

The following information is provided to assist in verifying possible image dates using information based on the type and style of the photographic mount.

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## GUIDE for DATING CARD MOUNTED PHOTOGRAPHS

Stereographs Cartes de Visites Cabinet Cards Photographic Postcards

Card mounted photo designation by size (all sizes in inches)

Boudoir	5 1/2 X 8 1/2	1880s
Cabinet card	6 1/2 X 4 1/2	1866 - 1900s
Cartes-de-visite	2 1/2 X 4	1850s - 1900s
Cigarette Card	2 3/4 X 2 3/4	1885-95, 1909-17
Imperial mount	7 X 10	1890s
Kodak circular images	4 1/4 X 5 1/4	1880s - 1890s
Panel card	13 X 7 1/2	1890s
Paris card	9 3/4 X 6 3/4	1890s
Promenade card	7 1/2 X 4	1890s
Stereograph	3 1/2 X 7 to 5 X 7	1850s - 1950s
Swiss mount	6 1/2 X 2 4/5	1890s

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**Stereograph dating (3 1/2 X 7)****Photographic images****Flat mount (3 1/2 X 7)**

Square corner	1857 - 70
White, cream or gray	1857 - 63
Shades of Yellow	1861 - 70
Red, green, blue, or lavender	1866 - 70
Rounded corner -Standard size	1868 - 90

**Larger, Cabinet sizes (5 X 7)**

Square corner	1870 - 75
Rounded Corner	1873 - 90

**Curved mount**

Buff	1879 - 1910
Gray	1892 - 1950
Black	1902 - 60

**Printed images -**

Ivory mount square corner printed	1857-60
B & W or colored halftone	1898 - 1930

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**Cartes-de-visites (2 1/2 X 4)**

Revenue stamps were used on card mounted photographs produced between

September 1, 1864 and August 1, 1866, most frequently on cartes-de-visites

Thin stock (.4 mm) with square corners	1860 - 1870
5mm stock with square or rounded corners	1870 - 1875
6mm stock with square or rounded corners	1873 - 1884
7mm stock with square or rounded corners	1879 - 1890s

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**Cabinet cards (6 1/2 X 4 1/2)**

Variety of colors from	1860s to ca 1910
Maroon or dark green	ca 1880.
Gold border	pre 1885.

Scalloped edges after mid 1880s.  
 Impressed border and lettering after ca 1890.

Photographic Postcards - Stamp Box identification (based on Southwestern U.S. Images)

ARGO (Defender Photo Supply Company)	1905
ARISTO - with eagle logo	up to 1907
ARTURA - in fleur-de-lis	1906
AZO (Kodak) with corner diamonds	1907
AZO (Kodak) with corner triangle pointing up	1904
AZO (Kodak) with corner triangle pointing up and down	1918
AZO (Kodak) with corner squares	1923
CYKO - in solid script - (ANSCO)	1905
CYKO - in open script - (ANSCO)	1904
DEFENDER	1910
DEFENDER with diamond inner box	1920
KRUXO with corner cloverleaf	1907
NOKO	1907
PMO	1907
SOLIO	1903
VELOX (Kodak)	1900
VELOX (Kodak) with corner triangle	1906
VELOX (Kodak) with corner diamonds	1907
VELOX (Kodak) with corner square	1900

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### Dating a Carte de Visite: Recapitulation

The criteria helpful in dating a pre-1890 carte may be summarized in three keys: card mounts, imprints and portrait images. Because of the enormity of the variations in each category, these keys should be used independently. When the conclusions based upon the three keys are compared, the approximate date should be determined.

The individual characteristics are indicative, not diagnostic. When combined, the results are reliable.

- I. *Principal card stocks in chronologic sequence*
- A Thin Card .010" - .020", generally .014" - .017"  
Square corners\*\* 1858-1869  
Color white  
plain 1858-1866, rarely later  
with border of one or two lines 1861-1869  
with oval frame for image 1863-1868  
face of card with printed background 1866-1868  
Color gray or tan, plain 1861-1866
- B Medium Thick card .020" - .030"  
Square corners  
Color yellow or white .020 - .026 1869-1871  
Round corners  
Color yellow or white .020 - .026 1871-1874  
Color gray .024 - .028 1872-1880  
Cards variously colored, red, lavender, green, blue; back of card of same or different color 1873-1880  
Cards chocolate, or black 1877-1887  
Cards with beveled edges, usually in gilt or red 1875-1881
- C Thick card, greater than .030"  
with or without beveled edge; colors as above 1880-1900  
Back covered with faint geometric designs 1881-1888  
Back with border of Egyptian or Japanese motifs 1881-1886  
Thickness exceeding .040" to .050" 1890-1910  
Card with lustrous front, edges notched or incised 1894-1900  
Card soft gray, corners cut square 1902-1910

\*Thickness refers to the card alone, not the mount and image; measured near one edge, conveniently with a micrometer caliper.

\*\*Square cards were occasionally used throughout carte de visite history, but the card thickness and color will immediately approximately date the card.

### 1. Principal types of imprints in Chronologic Sequence

- A Simple typeset imprint,  
small type 1860-1866  
Single line 1860-1862  
Two or three lines 1861-1866  
without "negatives preserved" or "duplicates can be had" 1861-1862  
with "negative" or "duplicate" 1861-1866  
With a vignette (eagle, shield, Liberty, etc.) 1862-1866  
With name vignnetted 1862-1865
- B Larger typeset imprint  
Usually three or more lines, commonly with other information 1863-1867
- C Background of reverse side of card  
ornamented ovoid shape 1864-1868  
With box to hold revenue stamp 1864-1866  
With cherub and camera above imprint space 1865-1872
- D Photographer's name printed lengthwise, in large type, back plain 1868-1882
- E NPA logo printed on the back 1871-1874
- F Elaborate designs, of great variety 1872-1885  
monochrome 1872-1885  
polychrome 1872 rare, 1873-1880, rarely later
- G Geometric designs (refer to illustrations) 1877-1884
- After 1885 the sharp decline in the popularity of cartes de visite was accompanied by less attention to the imprint. Many photographers simply used a rubber stamp while others devised highly individualized logos.

### III. Typical Portrait Styles in Chronologic Sequence

- A Head or Bust, plain background  
Vignnetted head  
image smaller than  $\frac{1}{2} \times \frac{1}{2}$  inches 1860-1864  
image  $\frac{1}{2}$ " -  $1\frac{1}{4}$ "  $\times$   $1$ " -  $1\frac{1}{4}$ " 1860-1867  
image larger than  $1\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " 1866-1870  
Bust covering half the area of the print 1870-1875  
Large head, image covering  $\frac{2}{3}$  of print 1874-1890
- B Seated figure, three-quarters to full length  
Plain background 1860-1868, rarely later  
Background a drape, simple furniture 1860-1866, rarely to 1868  
With accessories, such as vases, books, furniture, urns, etc. 1860-1870
- C Standing, full-length  
Background plain, uncommon 1860-1870  
Background a drape and/or column 1860-1868  
Background with accessories, including balustrades, steps, etc. 1860-1870  
Background of painted scenery, of infinite variety  
See illustrations 1861-1890  
(Note: compare card stocks)  
With rustic accessories 1875-1885  
With papier mache props 1875-1888, chiefly after 1880

## **RESOURCES**

### **RESOURCES FOR PRIVATE AND FAMILY COLLECTIONS**

(More leaflets available at: <http://www.nedcc.org/resources/leaflets.list.php>)

#### **NEDCC Offers Hints for Preserving Family Collections**

Libraries and historical organizations are often asked for advice on preservation by patrons and members. To meet this need, Northeast Document Conservation Center has developed a list of helpful hints for preserving family documents and memorabilia:

1. The best protection for your books, papers, photographs, and prints is a cool, dry, stable environment, e.g., moderate temperature and relative humidity with relatively little fluctuation, clean air and good air circulation, no natural or fluorescent light, and good housekeeping.
2. Don't store your valuable paper collections in attics or basements, which are commonly subject to excessive heat/and/or moisture problems. Also avoid storing collections beneath or in close proximity to water sources like washing machines, bathrooms, or air-conditioning equipment. Be sure to consider what is in the room above your collections.
3. Heat causes damage. Don't hang valuable photos, documents, or artworks over radiators, heating ducts, heat-producing appliances, or fireplaces. Books and boxed documents or photographs with long-term value should also be shelved away from heat sources.
4. Light causes fading and other damage. Keep photos and art (prints, watercolors, and other works on paper) in the dark as much as possible. Don't put valuable books and papers in direct sun or bright light of any kind. Hallways or other rooms without windows are best. Install shades and put up heavy curtains where you can't avoid windows.
5. Indoor pollution rapidly damages paper and is a growing problem in energy-conscious spaces with good insulation. Any valuable photo or artwork on display should be protected by a preservation-quality mat and frame. The glass or plastic covering of the frame protects the item from pollutants and dirt.
6. A musty smell is sometimes noted in books that have been moldy or mildewed in the past. To remove the musty smell from old books, first make sure they are dry. Place the books in a cool, dry space for a couple of hours. If damp, open the books, stand them up, and fan the pages to allow drying. A fan will help circulate the air. If the smell remains, one option to remove it is paper containing Zeolite molecular traps. Known as MicroChamber® products, these papers have proven very effective in removing odors. We suggest placing a sheet of the lightweight, 100 percent cotton interleaving tissue between the front board and the endpaper, every 100 pages throughout the volume, and again between the back board and endpaper. Close the book and set it aside until the odor has been reduced. You may need to replace interleaving several times, putting new sheets at different locations in the book.

#### **Storage Enclosures**

1. Storage enclosures must be durable and provide physical support. The following characteristics apply to enclosure design. (a) Enclosures should be stiff enough to protect their contents from tears, breaks, slumping, or other distortion. (b) Boxes should be fully closed (without gaps or handle holes), with snug lids to exclude abrasives and other pollutants. (c) The size and shape of envelopes, boxes, folders, or other enclosures should closely match the object or objects they hold. (d) Book boxes should be custom-made to the dimensions of each book.
2. Storage enclosures must also protect against chemical deterioration. Unfortunately there are not scientific standards defining the term *archival-quality* enclosures, and this term in catalogs can be misleading. When purchasing enclosures, look for specific terms that indicate the stability of the enclosure. Boxes, mats, folders, and other paper enclosures for preservation use at home should be *low-lignin* or *lignin-free*, and *buffered* throughout. Avoid lignin because it is a component of paper that leads to the formation of acid. The term *buffered* refers to the process of adding a buffer (such as calcium carbonate) during manufacturing to neutralize acids as they form over time in the storage materials.
3. Be aware that paper enclosures labeled *acid-free* most likely do not have a buffer added, and they may not be lignin-free or low-lignin. These enclosures may become acidic relatively quickly. While buffered paper enclosures are generally preferred to acid-free, some drawings and paintings on paper, blueprints, and some photographs may be damaged by the chemicals used as buffers. These should be stored in *neutral* (unbuffered), low-lignin enclosures if paper enclosures are used.
4. The terms *acid-free*, *buffered*, and *lignin-free* do not apply to plastic enclosures. Instead, look for enclosures made from specific types of plastic. Preservation-grade polyester, known by brand names such as Melinex 516, is the most stable. Polyethylene and polypropylene can be used if they contain no plasticizers. Acetates can change dimension, so they are not recommended. Plastic enclosures made from polyvinyl chloride (PVC) should never be used for preservation storage."
5. When considering paper or plastic enclosures for photos, select enclosures that pass the Photographic Activity Test (PAT). This test ensures that the enclosure will not react chemically with photographs. Supplier catalogs should indicate whether a photographic storage product has passed the PAT.

### **Specific Media**

1. Letters, clippings, and other documents should be stored unfolded, because folding and unfolding breaks paper along the fold lines. Storing documents in folders rather than envelopes is recommended, because envelopes can cause damage as items are removed and replaced.
2. To preserve wedding pictures (or photos of any event) as long as possible, be sure the photographer takes a roll of black-and-white film. Although improvements in technology have extended the life of color prints and negatives, color materials still do not last as long as traditional black and white photographs and negatives.
3. If you produce color photographic prints at home from an inkjet printer, these prints are not considered preservation quality, and no standards govern their longevity. To maximize the quality and durability of this type of color print, it is best to use the inks and photographic paper recommended by the printer manufacturer, rather than third-party inks or papers.

4. When storing photos in an album, use "photo" or mounting corners (available from preservation suppliers), not "magnetic" pages (which actually contain adhesive that can stick to or react with your pictures). Choose a photo album with buffered or neutral, good-quality paper and/or polyester, polypropylene, or polyethylene pages — not vinyl or PVC.
5. Make multiple backups of all digital photographs and other valuable media. Videotape, magnetic disks (hard drives and floppy disks), CDs, and DVDs all have a limited life expectancy and are subject to both gradual deterioration and catastrophic failure.
6. If you want to preserve a newspaper clipping for the long-term, photocopy it onto paper that meets the American National Standard for Permanence of Paper for Publications and Documents in Libraries and Archives, ANSI/NISO Z39.48-1992 (rev. 1997). See the North American Permanent Papers website, <http://palimpsest.stanford.edu/byorg/abbey/napp/>, for a list of permanent papers.
7. To remove staples or old paper clips from documents (especially if they're rusty), slide a piece of stiff plastic (e.g., polyester, polypropylene) under the fastener on both sides of the document. Slide the paper clip off the plastic, or bend the edges of the staples up and pry it out with a pair of tweezers or a thin knife. The plastic protects the paper from abrasion and from damage by your tools. Do not use a staple remover, because it is likely to tear the paper.

Compare catalogs to find the supplies you want for the best price. Read product descriptions; if you have questions about the composition of a product, ask the supplier for details. If you can't get that information, find another supplier. There are now many excellent sources for storage enclosure and other preservation supplies. Many will sell to individuals and in small quantities. See NEDCC's online [Suppliers List](#) for up-to-date contact information for suppliers. See also NEDCC's preservation leaflets "[Storage Enclosures for Books and Artifacts on Paper](#)" and "[Storage Enclosures for Photographic Materials](#)" for additional information on choosing enclosures.

## PHOTOGRAPHS

### 5.1 A Short Guide to Film Base Photographic Materials: Identification, Care, and Duplication

**Monique Fischer**  
**Senior Photograph Conservator**  
**Northeast Document Conservation Center**

#### Introduction

There are three broad types of film base photographic materials: cellulose nitrate, the cellulose acetates, and polyester. These materials have been used as a support for negatives, positive transparencies, motion pictures, microfilm, and other photographic products. Unfortunately, cellulose nitrate and the cellulose acetates are unstable. Their degradation products can severely harm and even destroy photographic collections, in addition to posing serious health and safety hazards.

#### Identification

##### Nitrate Film Base

In August 1889 Eastman Kodak began selling the first photographic negatives on cellulose nitrate flexible film support. This innovation was the beginning of a revolution in photography. The increased convenience of flexible films allowed professional photographers to shoot more pictures under a greater variety of conditions; it also created a new amateur market which quickly became the economic foundation of the photo industry. Nitrate film remained in production in various formats, until the early 1950's.

As a photographic support it had some serious disadvantages. Nitrate film was, and is, highly flammable, it releases hazardous gases when it deteriorates. Large quantities of nitrate film has caused several disastrous fires. Due to the instability of cellulose nitrate, much of our photographic legacy from this period is disappearing.

A photographic collection that contains any flexible, transparent film negatives from the time period of 1890-1950 has nitrate film in it. These negatives need special attention and should immediately be separated from other negatives. Deteriorated nitrate negatives are easy to identify, but nitrate negatives in good condition are almost indistinguishable from other types of transparent films. There are four ways to identify nitrate negatives.

##### 1. Edge printing

Many manufacturers stamped professional sheet films with an identification along one border. The words generally identified the manufacturer and the type of film: nitrate or safety. Unfortunately edge printing was not done by all manufacturers; nor was it done on early nitrate negatives, nor on some roll film formats. Amateur roll films were not marked but can be identified by their tendency

**FIGURE 1**



to curl into very tight scrolls.

Later roll films were coated on both sides to prevent such curling. A "V" notch code (1st from the edge) can also identify Kodak sheet film (prior to 1949) as nitrate. (See Figure 1.)

##### 2. Dating Information

The dates Eastman Kodak stopped the manufacture of nitrate film follow. If a negative can be accurately dated, either by subject or by the photographer's notes, it is possible to determine if it is nitrate film.

<i>Type of Film</i>	<i>Last Year of Nitrate Manufacture</i>
X-ray films	1933
Roll films in 35mm	1938 (A)

Portrait and Commercial sheet films (B)	1939
Aerial films	1942
Film Packs (C)	1949
Roll films in sizes 616, 620, etc. (D)	1950
Professional 35mm Motion Picture films (E)	1951

#### NOTES

It has always been a common practice for photographers to purchase bulk rolls of 35mm motion picture film and respool it into cassettes for still camera use. So it is possible to find still camera negatives on nitrate film for an additional 13 year period after this date.

Nitrate sheet film tends to have a very thick and rigid base. Professional sheet film negatives will also have notches on one corner. These notches are used by photographers to determine the emulsion side in the dark.

Film pack negatives were produced in the same sizes as sheet film. Film packs used a much thinner and a very flexible based film. These negatives will feel like roll film. They lack a notch code, but may have a negative number, generally 1 through 12.

These sizes were called amateur roll film formats. Most families probably have a small number of these negatives stored in their home with no idea of the hazard they present.

Professional 35mm motion picture film represents the greatest hazard. All nitrate 35mm motion picture film should be duplicated by an authorized laboratory. Then the nitrate motion picture film should be disposed of through the local fire marshal or a hazardous materials disposal service. NOTE: 16mm, regular 8, and super 8 movie formats were considered amateur formats and were always made on a safety film base.

Unfortunately Eastman Kodak is the only manufacturer that has supplied any dates on nitrate film production. These dates do not apply to other manufacturers' films. Nor do they give an indication of when Kodak started selling safety films. For example, nitrate sheet film production ended in 1939, but Kodak began test marketing safety based sheet film sometime in the mid 1920's. For most formats there was a carry over period when both types of film were made.

### **3. Nitrate film base deterioration**

A third means of film base identification is based on the observations of deterioration characteristics. Nitric oxide, nitrous oxide, and nitrous dioxide are all released as gases from the decomposition of cellulose nitrate. In the presence of atmospheric moisture, these gases combine with the water to form nitric acid. The formation of nitric acid acts to further degrade the cellulose nitrate film, it can destroy enclosures in which the negatives are stored, and it can also damage materials in close proximity to the collection.

Institutions should isolate and properly store cellulose nitrate materials because of their extreme flammability, especially when in a deteriorated condition. They should be stored in a controlled environment of relatively low humidity or, ideally in cold storage.

Cellulose nitrate decomposition can be very rapid. Deterioration is generally categorized in six progressive stages:

- Level 1     No deterioration.
- Level 2     The negatives begin to yellow and mirror.
- Level 3     The film becomes sticky and emits a strong noxious odor (nitric acid).
- Level 4     The film can become an amber color and the image begins to fade.
- Level 5     The film is soft and can weld to adjacent negatives, enclosures and photographs.
- Level 6     The film can degenerate into a brownish acid powder.

Most negatives will retain legible photographic detail into the third stage of decomposition. These negatives may become brittle, but with careful handling can be duplicated. Negatives in the fourth, fifth, and sixth stages of decomposition generally have no legible image and should be either placed in cold storage or duplicated.

#### **4. Testing**

Tests provide a more exact, but not completely definitive, way of identification. There are four tests, three of which are destructive; they require that a sample be taken from the film base material in question. Any destructive tests should be performed only after all other identification procedures have been conducted and identification remains uncertain.

##### *a) Polarization*

When viewed between cross-polarized filters, polyester and other highly birefringent materials exhibit red and green interference colors like those seen on soap bubbles. Cellulose nitrates and the cellulose acetates do not show these interference colors. The Polarization Test can be performed with the simple viewer described below.

To use the viewer unfold the viewer and place a corner of the material in question over one polarizing filter. Close the viewer and hold the viewer up to a light source. Tilt viewer back-and-forth and side-to-side, red and green interference colors will be most apparent in clear areas. If a material is badly deteriorated, examine it on a light table with one polarizing filter underneath it and one on top of it.

##### *Instructions for Making a Viewer*

1. Tape together two pieces of mat board along their long edge.
2. At the left corner of each mat board split an area slightly larger than the polarizing filter.
3. Cut a hole in each split area smaller than the polarizing filter.
4. Slip polarizing filters into each split board. Be sure to place the filters so that they are almost at cross polars to one another. This will be at the point at which they block the most light passing through them.
5. Apply double-sided tape to reattach the split boards and to hold the filters in place. (Polarizing filters are available at toy stores in many children's science kits.)

##### *b) Diphenylamine Test*

Handle this solution with caution. It contains 90% sulfuric acid! A solution of diphenylamine and sulfuric acid can be used to identify cellulose nitrate. In this solution cellulose nitrate turns a deep blue color. Cellulose acetate and polyester do not produce this color. However, cellulose nitrate is used in very small amounts in the manufacture of cellulose acetate and polyester products. This "subbing layer" does not appear to effect either the longevity or the safety of these materials, but may cause a very faint blue tinge to be seen in the support of the cellulose acetates and polyester.

Place sample on a microscope slide and apply a drop of the prepared solution. After one minute, a cellulose nitrate sample will turn completely blue while the cellulose acetates and polyester will not. In some cases, a large cellulose nitrate sample may exhaust the solution and no blue color will form. Therefore, to confirm a negative test, apply two more drops and wait another minute to confirm that the sample is not cellulose nitrate.

The solution is somewhat sensitive to light. Before testing unknowns, test the efficacy of the solution with a known sample of cellulose nitrate such as DUCO Cement or UHU All-Purpose Clear Adhesive.

Instructions for the preparation of this solution can be found in: Canadian Conservation Institute. (1989). "The diphenylamine spot test for cellulose nitrate in museum objects." CCI Notes (17/2).

##### *c) Burn Test*

Do not perform in your collection! Cellulose nitrate is extremely difficult to extinguish. The burn test uses the flammable nature of cellulose nitrate for identification since both the cellulose acetates and

polyester are much less flammable. Cellulose nitrate burns quickly and has a characteristic yellow flame. Having known materials for comparison is particularly important for this test. Hold sample vertically with metal tongs. Be sure to ignite the strip from the top, only cellulose nitrate will burn downwards. For safety, have a large container of water nearby.

#### d) Float Test

Trichloroethylene is toxic and a carcinogen! Conduct this test in a well-ventilated area, wear rubber gloves, and use with extreme caution. The float test may be used to identify film base types due to their differing densities. Cellulose nitrate being the most dense will sink, while cellulose acetate will rise to the top. Polyester should remain in the center of the solution. Results from this test may be difficult to interpret because deteriorated acetate film may sink to the bottom like nitrate film. Another complicating factor is that the specific gravities for cellulose nitrate and the cellulose acetates fall within a fairly broad range which may cause materials to behave differently. As with the other tests, having a known sample for comparison can be extremely helpful. Place sample in a test tube of trichloroethylene. Shake test tube so sample is completely immersed. Observe location of sample in the liquid.<sup>1</sup>

### Acetate Film Base

Nitrate film was, and is, highly flammable. It releases hazardous gases, when it decomposes naturally. Beginning in the mid 1920's, it was slowly replaced with cellulose acetate film base (cellulose diacetate, cellulose acetate propionate, cellulose acetate butyrate and cellulose triacetate.) It became known as "Safety" film. However, the cellulose acetates do have stability problems. The deterioration of cellulose acetate is autocatalytic, like that of cellulose nitrate; once deterioration has begun the degradation products induce further deterioration. It affects the plastic support of acetate film, causing it to become acidic, to shrink, and to give off an odor of acetic acid (vinegar).

A useful tool in helping determine the amount of acid vapor present, and gain an overview of the condition of acid-vapors in an entire collection are "A-D Strips" (acid-detecting strips) from the Image Permanence Institute at the Rochester Institute of Technology in Rochester, NY. They are acid-base indicator papers which turn from blue to green to yellow in the presence of acid, and measure the extent of the acetate base support deterioration.

As with nitrate negatives, deteriorated acetate negatives are easy to identify, but in good condition are almost undistinguishable from other types of plastic films. There are also four ways to identify acetate film base negatives.

#### 1. Edge printing

Some cellulose acetate film base materials have the word "Safety" contained in the border. Those manufactured prior to 1955 are definitely acetate. Edge printing may also include the name of the manufacturer, manufacturing code data, and notch codes. "The Acetate Negative Survey Final Report" by Horvath is an invaluable resource for identifying cellulose acetates using this information.<sup>2</sup>

#### 2. Dating information

	Sheet Film	Roll Film
Cellulose diacetate	1925-1950	1920s-1935
Cellulose acetate propionate	1930-1945	1920-1945
Cellulose acetate butyrate	1935-present	—
Cellulose triacetate	1945-present	1945-present

#### 3. Acetate film base deterioration

When acetate base film is stored in a poor environment at high heat and humidity, or exposed to acidic vapors from nearby degrading film, cellulose acetate undergoes chemical reactions within the plastic support to form acetic acid. It causes the support to become acidic, brittle, and shrink. This

in turn spreads into the gelatin emulsion or into the air creating a harsh, acidic odor. It is a slow form of chemical deterioration known as "Vinegar Syndrome." It places acetate film at risk, and then deterioration may place otherwise stable photographic materials at risk as well.

Deterioration is generally catalogued in six progressive stages:

- Level 1      No deterioration.
- Level 2      The negatives begin to curl and they can turn red or blue.
- Level 3      The onset of acetic acid (vinegar smell); also shrinkage and brittleness.
- Level 4      The warping can begin.
- Level 5      The formation of bubbles and crystals in the film.
- Level 6      The formation of channeling in the film.

#### **4. Testing**

(See nitrate testing section.)

#### **Care**

##### **Environment**

The deterioration of both cellulose nitrate and cellulose acetate negatives is highly dependent on temperature and relative humidity. Ideally, to minimize decomposition, negatives should be stored in a freezer. At freezing temperatures the natural decomposition of cellulose nitrate and acetate is slowed down. The cold storage of small numbers of negatives can be done easily, but the cost and inconvenience of freezing a large collection can be prohibitive. However, cold storage is predicted to extend the life of acetate negatives by a factor of ten or more. (See "Image Permanence Institute Storage Guide for Acetate Film" by James Reilly.)

A good resource on cold storage is Henry Wilhelm's "Permanence & Care of Color Photographs" (1993), Grinnell, Iowa: Preservation Publishing Co. Chapter 19. A fairly inexpensive cold storage unit is a large commercial freezer which should defrost automatically. Storage materials designed to preserve photographic materials are archival boxes placed in polypropylene bags and then sealed with humidity control cards. This allows the stored items to warm at room temperature safely (8–12 hours should be sufficient) and can be easily accessed. The Safe Care® Archive Freezer Kits are available at Metal Edge, Inc. (800) 862-2228.

A less costly option for storage would provide a controlled environment with the constant temperature at 68° F (20° C), and relative humidity between 20% and 30%. Rapid changes in temperature and humidity will hasten deterioration. A dark and well ventilated area around the negatives will allow the gases to dissipate.

##### **Storage**

Cellulose nitrate negatives should be stored separately from other negatives in a collection. They present a great potential hazard to other materials because of their flammability and because of the strong acid formed from gases that the negatives release.

Three layers of protection are recommended for the storage of film base photographic materials. Negatives should be placed in sleeves, sleeves in a box or drawer, and these boxes or drawers on shelves or in a cabinet. Motion picture film and microfilm should be stored in unsealed containers in cabinets or on shelves. (All enclosures should pass the Photograph Activity Test (PAT) as described in ISO Standard 14523:1999.)

Negatives should be stored in individual, seamless, high alpha cellulose content paper enclosures. They are recommended to allow for the dissipation of harmful gases. Acid-free paper will resist deterioration caused by the formation of acids. Enclosures that have been used to store negatives

must never be reused. They will retain acids, and anything placed in them will be damaged. Disposal of used enclosures is recommended in order to avoid reuse.

Again, an invaluable source is "Image Permanence Institute's Storage Guide for Acetate Film" by James Reilly. It is a tool for evaluating and planning storage environments for acetate-based photographic film.

## **Duplication**

### **When?**

Duplication is an ongoing process. Negative collections should be inspected regularly for signs of deterioration. Any negatives that show signs of deterioration should be duplicated as soon as possible. The more advanced the stage of deterioration the quicker the negative should be duplicated to minimize the amount of image detail lost. Other factors which need to be considered are size and use of collection, space available for storage and financial resources.

Nitrate and safety negatives in good condition that need to be printed or handled often should also be duplicated. The duplicate negative can then be used while the original remains in cold storage. This minimizes the potential of damage to, or loss of, the original negative.

### **Tone Reproduction and Image Permanence**

There are two areas of concern when considering duplication of film base materials. The first is tone reproduction. How accurately does the duplicate negative resemble the original? The second is image permanence. The duplicate must be made on the most stable modern films and processed according to the highest archival standards using recommended techniques.

Every duplication system should be designed for good tone reproduction. The duplicate negative should resemble the original in all aspects. They should have the same density range, the same overall density, and the same amount of detail. Sensitometry is the study of photographic materials and their response to exposure and development. By using sensitometric tests a photographer can design a duplication system that will replicate the original negative as accurately as modern materials will allow.

Most negatives are duplicated because their image content is in imminent danger of being lost. The duplicate will be the only record of a negative after the original has decomposed (deteriorated). Therefore the duplicate must have maximum image permanence. The permanence of a photographic image is affected by three things: the stability of the photographic material, how it is processed, and how it is stored.

Photography is based on light-sensitive silver molecules, which are exposed to light and then intensified by development. Silver is chemically a very stable metal, and photographic images are stable provided they are mounted on a stable support. Because of its increased stability, duplicate negatives should be made on archivally processed modern polyester based films, which should be archivally processed.

## **Options**

1. *Prints.* The simplest way to duplicate negatives is to make a print and then use a camera system to create a copy negative of the print. This is a common procedure for prints in a collection for which there are no original negatives. This procedure can be done in even the simplest darkroom. Large format original negatives can be contact printed, while prints from smaller negatives can be enlarged to a standardized size print. The prints should all be made on fiber based photographic paper for maximum permanence. New prints are then copied using a large format camera, 4" x 5" format or larger.

The biggest advantage of making prints and copy negatives is the cost and convenience. Most museum darkrooms or local photo labs should be able to do the work with little or no investment in equipment. The disadvantage of this system is loss of detail in both the print and the copy negative. A print always has detail loss and a compressed tonal range compared to the original negative. If a negative has a difficult-to-print density range, image loss can be quite noticeable. Further detail is lost when the copy negative is made.

2. *The Interpositive/Duplicate Negative Process.* The most versatile duplication process produces a film interpositive and duplicate negative. The original negative is contact printed onto a sheet of film and processed. This yields a positive image on film, an interpositive. The interpositive is contact printed to produce a duplicate negative. This process can produce the most accurate duplicate negatives modern films are capable of producing.  
An interpositive is an archival copy that can be used to make as many duplicate negatives as needed. The original negative can remain in storage, or if deteriorating can be destroyed. This process can also correct some problems of original negatives. Through the use of special films and filters, staining on original negatives can be reduced on the interpositive. The interpositive should be an exact copy of the original negative, but if the original is too contrasts to print on modern photographic paper, an adjusted duplicate can be made from the interpositive. The adjusted duplicate will have a compressed density range capable of being printed with minimal loss of detail. The disadvantage to the versatility of this system is higher production costs and complexity. However, this method results in two copies for relatively little additional cost and additional storage requirements.
3. *Continuous Tone Microfilm.* The roll microfilm provides easy access to entire photographic collections. This type of microfilm supports the greater dynamic range [shades of gray] typical of photographs while line detail remains excellent. The advantages of the roll film format are that it provides ease of access to the collection at lower cost. It provides an excellent reference copy for users thereby limiting the use of the original material. And microfilm has a life expectancy of 500 years. The disadvantage of this format is that it does not capture the level of detail that a larger format is capable of capturing.
4. *Digital Imaging System.* There are a wide array of digital systems available for capturing and storing photographic images. The access capabilities of these systems are impressive, however, the long-term storage of the images is problematic. Scanning the photographic materials is one approach to access, but it is very expensive, requires a lot of expertise (or dependence on a company with that expertise), and data will have to be migrated over time as the hardware and software become obsolete. Therefore they may not be an appropriate preservation alternative for your collection and institution.

### **Conclusion**

The identification, care, and duplication of a photographic negative collection is a complex task. Therefore, any approach should rest on a solid foundation of accurate identification of film base materials in a collection, a good understanding of the collection's present and future uses, and maintenance of proper storage and environment.

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#### **List of Suppliers**

For a list of suppliers visit NEDCC's website at <http://www.nedcc.org/resources/suppliers.php>.




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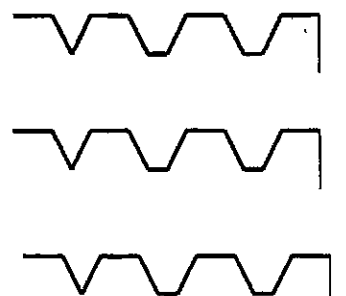






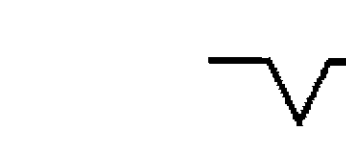


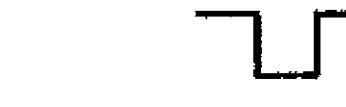
## Photonegatives identification tips










[Notch codes](#)[Other online resources](#)

**Notch codes:** One step toward determining whether a film negative is cellulose nitrate is to examine the notch codes and the film type wording on the edges of the negative. Following is a chart, dated May 2001, source presently unknown, that we use for this purpose at the Center of Southwest Studies. (A) denotes safety film, (N) denotes nitrate. "Possibly" indicates that in our testing using other methods (burn test, acid test, etc. described at <http://www.cr.nps.gov/museum/publications/conservcogram/14-09.pdf>) we found that on occasion the film was nitrate whereas the notch code and the wording printed on the film would have led us to believe that it was safety film.

**Arrangement of these descriptions:** we have grouped these by physical type of film markings: V-shaped notches, square notches, combinations of V-shapes and squares, and no notches at all.

Description of notch on this type of film	Wording on the film	Is this type cellulose nitrate?
1. 	(A) Kodak Safety Film	no ( <i>but see also samples 14 and 18</i> )
2A. 	(A) Kodak Safety	possibly
2B. 	(A) Kodak Safety Film	no
	(A) Kodak Safety	no
	(A) Kodak Safety Film	no

3.		(A) No wording	no
8.		(A) No wording (A) Eastman Safety Kodak	no
14.		(A) No wording	yes
18.		(N) Eastman-Nitrate-Kodak (N) Nitrate Kodak	yes
19.		(N) Eastman-Nitrate-Kodak	yes
20.		(N) No wording	yes
21.		(S) No wording	?
23.		(N) Eastman Nitrate Kodak (N) Eastman Kodak <i>[can be safety, though]</i>	possibly
24.		(A) Eastman Safety Film	no
6.		A) Ansco Safety Film	no
7.		(A) Eastman Kodak Safety (A) Eastman Safety Kodak	no

10.		(A) Ansco Safety Film	no
11.		(A) Agfa Safety Film	no
29.		(A) Ansco Safety Film	no
4.		(A) Eastman Safety Kodak	no
5A.		(A) Eastman-Safety-Kodak	no
5B		(A) Eastman-Safety-Kodak (A) Eastman-Safety-Film (A) Kodak Safety Film	no
9.		(A) Kodak Safety (A) Kodak Safety Film (A) Eastman Safety Kodak	no
12.		(A) Eastman Safety Kodak	no
25.		(A) Eastman Safety Film	no
13. No notches.		(A) Kodak Safety Film (A) Kodak Safety	possibly
15. No notches; film size 2 1/4"		(A) Kodak Safety Film	no
16. No notches; film size 2 1/4"		(A) No wording	possibly
17. No notches		(A) No wording	possibly

22. No notches	(A) Kodak Safety	no
26. No notches	(A) Agfa Superpan Press	no
27. No notches	(N) Eastman Nitrate Kodak	yes
28. No notches	(A) Agfa	no
30. No notches	(A) Ansco Superpan	no

### Additional online resources for identification of nitrate negatives:

More notch codes (source of this guide is unknown): <http://www.srv.net/~vail/notch.htm>

*Code notches for KODAK sheet films:*

<http://www.kodak.com/global/en/professional/support/techPubs/f3/f3.jhtml>

*Identification of film-base photographic materials* (National Park Service Conserv O Gram Number 14/9, Sept. 1999, 4 pages): <http://www.cr.nps.gov/museum/publications/conservoogram/14-09.pdf>

*A short guide to film-base photographic materials: Identification, care, and duplication* (by Monique Fischer, Photograph Conservator, Northeast Document Conservation Center, updated Nov. 2003, 11 pages): <http://www.nedcc.org/leaflets/nitrate.htm>

*The dangers of cellulose nitrate film* (includes a brief historical note of assistance in identifying this type of film) (by the Health and Safety Executive in the U.K., Aug. 2003, 16 pages): <http://www.hse.gov.uk/pubns/cellulose.pdf>

*Methods that can be used to identify cellulose acetate within collections* (National Library of Australia, Preservation Services, National and International Preservation Activities [NIPA], Australian Network for Information on Cellulose Acetate [ANICA]): [http://www.nla.gov.au/anica/Guide\\_pg3.html](http://www.nla.gov.au/anica/Guide_pg3.html)

From Richard Pearce-Moses (ed.) *Visual Materials Bibliography* (available in [Conservation OnLine](#)):

Horvath, David. *"The Acetate Negative Survey: Final Report."* A project funded by the University of Louisville and the National Museum Act. Louisville, Ky: Photographic Archives, Eckstron Library, University of Louisville, 1987.


Unpublished report which received limited distribution. A history and analysis of acetate negatives, their stability, and recommendations for preservation. Includes a guide to notch codes. 91 pp.

*Caring for cellulose nitrate film* (National Park Service Conserv O Gram Number 14/8, April 1998, 4 pages): <http://www.cr.nps.gov/museum/publications/conservoogram/14-08.pdf>

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This guide was compiled by J. Todd Ellison, Certified Archivist, Center of Southwest Studies, Fort Lewis College, in July of 2004, and is for study/ comparison purposes only.

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Page last modified: July 20, 2004

## A Rough Guide to Preserving Document and Scrapbook Materials

By Ashley Large, MLS

### STORAGE:

**Remember: According to the National Archives, “Unsuitable environments damage documents more extensively than any other single factor.”**

- Cool, dry, and dark is best!!
- Keep away from
  - Bugs
  - Food
  - Mold
  - Water sources
  - Exterior walls
  - Light (both artificial and natural)
  - Fluctuating humidity
  - Heat
- Avoid attics, barns, basements, and sheds.
- Environment should be as clean as possible.

### ENCLOSURES:

- Enclosures further protect archival materials from the elements. They also protect materials from each other.
- Make sure that the enclosures you are using are truly “archival:” acid-free, lignin-free. Plastic enclosures should not contain polyvinyl chloride (PVC) and are best if made from polyester, polypropylene, or polyethylene.
- When purchasing supplies, consider your priorities and your budget. On which object(s) will you spend the most money? The least?

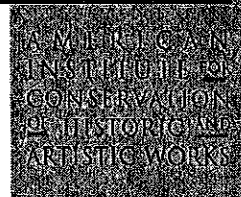
### WORKING WITH DOCUMENTS

- Bring the documents to a stable, clean environment that preferably adheres to the suggestions above.
- Remove all metal fasteners (paperclips, staples), making sure to keep relevant materials together using acid-free paper or archival plastic paperclips.
- Unfold any folded documents.
- Remove correspondence from envelopes and unfold.
- Gently brush dirt and debris away.
- Buffer acidic (yellowing) items with acid-free tissue or paper.
- Store in labeled (with pencil) acid-free folders in acid-free boxes.

## WORKING WITH SCRAPBOOKS

- Bring the scrapbook to a stable, clean environment on a table that physically supports the book well.
- Interleave pages with acid-free tissue to protect items from each other. Be mindful of any stress on the binding caused by extra leaves or by handling.
- Collect loose items and store each in an acid-free envelope with precise labeling about where that item was originally found. Loose photographs can go in either acid-free envelopes or archival-quality plastic enclosures.
- Some repairs should only be taken on only by a trained conservator: reformatting, paper tears, reattaching loose items (do not re-glue or re-tape on your own), rebinding, and deacidification.
- Before going to a conservator, consider your budget and your priorities. Conservators do excellent work but can be expensive.
- Store scrapbooks either facing spine-down (foldered) or laying flat in acid-free boxes. When laying flat, buffer the book against the sides with acid-free tissue.

# CARING FOR YOUR TREASURES



## HOW TO PROTECT YOUR BOOKS

The book is an ingenious invention. Compact and portable, it has been the primary means of transmitting and preserving mankind's accumulated knowledge for hundreds of years. Throughout that time, printers and bookbinders have used a wide variety of materials and structures. Some have proven to be remarkably durable; others have been vulnerable to chemical deterioration and mechanical stress. While these problems can be quite complex, a few simple preventive measures can greatly extend the life of a book.

## ENVIRONMENTAL CONDITIONS

Books are composed of a variety of materials: paper, cloth, leather, paste, and glue. These, like all organic materials, are vulnerable to conditions and changes in the environment in which they are kept. Key factors are light, temperature, and humidity.

Books should not be exposed to excessive amounts of light. Daylight and fluorescent light, which have high levels of ultraviolet radiation, cause the most rapid deterioration and fading. Normal incandescent house lights are less harmful, although all light causes some damage. Keep lights turned off in rooms that are not in use. Block daylight by using curtains, shades, or plastic filtering films.

Similarly, books should not be exposed to rapid changes or extremes in temperature and humidity. Hot and dry conditions will desiccate and embrittle leather and paper; damp conditions will encourage mold growth. Therefore books should not be kept near sources of heat, such as radiators or fireplaces. Bookshelves should not be placed against outside walls, where pockets of cool damp air can develop. Air conditioners, dehumidifiers, and humidifiers can be used to remove or add moisture or heat. A cool, dry, and stable environment is ideal. Where the book rooms are in regular use, around 70 degrees Fahrenheit and 50 percent relative humidity is recommended.

## SHELVING

It is extremely important that books stood vertically on shelves are squarely upright and firmly supported by neighboring books or by bookends. Leaning at an angle puts stress on the entire book structure, deforming the spine and the joints where the covers are attached. Bookends must be stable and smooth so as not to damage the covers. Books should not be packed together so tightly, however, that they are difficult to remove without causing damage. Large, oversized books are best laid horizontally in stacks of no more than two or three high. Protective pads, such as squares of polyester felt, may be placed between stacked books to prevent them from rubbing.

Books on a shelf should be kept an inch or so back from the edge. The bare ledge of shelf will show up dust and droppings signaling insect activity. However books should not be pushed to the back of the shelf. Good air circulation is imperative to prevent stagnant air pockets where condensation will collect and mold will grow.

Important or fragile books may require additional protection. Check with a conservator about the variety of available solutions: polyester book jackets and wrappers, wrappers made of lightweight alkaline paperboard, double-tray boxes, and book shoes.

## STORAGE

When books must be packed away for storage, do not wrap them in common household plastics (plastic kitchen wrap, garbage or cleaner bags) because these emit harmful gases as they degrade. Storage boxes made from alkaline corrugated cardboard designed for the purpose are available from conservation suppliers. Avoid storing boxes of books in attics, garages, or basements, where temperature and humidity fluctuations are great, where pests may be a problem, and where leaks or floods are common. Always allow at least four inches of space between the boxes and the walls, ceilings, and floors.

Many book materials are attractive to pests. Rats and mice, silverfish, and a host of smaller insects are common troublemakers. Watch carefully for signs of their presence. Vigilant housekeeping discourages them. If there is an infestation, consult a conservator.

## HANDLING AND USE

Most books are not museum objects: their purpose is to be used and read. The handling of books, however, provides opportunities for accidental damage.

Handle books only with freshly washed hands. Most of the dirt on book covers and pages is accumulated grime from oily fingerprints. While invisible initially, finger grease becomes all too visible as it oxidizes and collects dirt. Wearing white cotton gloves for handling rare bindings is a good preventive measure, but turning fragile or brittle pages with gloves may cause damage and is not advised.

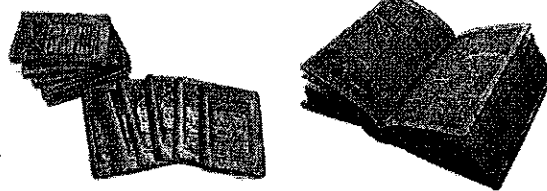
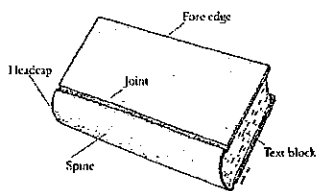
When removing a book from the shelf, do not pull it out by its headcap, which is apt to break. Either push the two neighboring books back in order to grab the spine in the middle, or stretch a finger along the top edge of the book and rock it back in order to grab the spine.

Avoid carrying tall, unstable stacks of books that may fall. If it is necessary to transport more books than can be held securely in two



A GUIDE FOR CLEANING, STORING, DISPLAYING, HANDLING, AND PROTECTING YOUR PERSONAL HERITAGE

# BOOKS



“ MOST BOOKS ARE NOT MUSEUM OBJECTS: THEIR PURPOSE IS TO BE USED AND READ ”

hands, pack them snugly in boxes to prevent shifting and sliding. Never pack or shelf books fore edge down as this position suspends the entire weight of the book from its joints and pulls the text block out of its cover.

A book is designed to be cradled in the reader's hands or lap; in this position very little stress is put on its spine or joints. Placing a book flat on a table can put tremendous stress on the structure, flattening the spine and stretching the joints. If a book must be opened on a flat surface, protect both covers by placing a support, such as another book, on either side. Alternatively, cradle the book in a towel with the two ends rolled up to support the covers.

Similarly, never place an open book face down onto a flat surface, which forces the book open to a 180-degree angle. If a book must be photocopied, use a photocopier with an edge platform that requires only a 90-degree opening.

Other important tips: Use pencil, never pens (especially ball point and felt tip pens) on books as ink may run, bleed, or transfer onto other pages. Use only paper bookmarks, rather than metal or leather, which will tear or stain the pages. Avoid paper clips and other mechanical fasteners. Do not use the popular self-sticking memo slips as these leave an invisible residue of adhesive on the page to attract dirt. Avoid storing newspaper clippings, flowers, letters, or other miscellaneous material in books as they leave stains and stress the binding. And of course avoid eating, drinking, and smoking around books as the spills and stains are generally permanent.

## CLEANING AND MAINTENANCE

Books and book collections need to be cleaned regularly to remove accumulations of dust and dirt and to monitor their condition.

When dusting the edge of a book, be sure to wipe away from the headcap toward the fore edge, with a clean cloth or soft brush. Dirt brushed down the spine of the book is trapped there forever. A vacuum cleaner can also be used with the suction reduced. Cheese cloth or soft screening can be tied over the nozzle as an extra precautionary measure to catch any loose bits that might accidentally break off. More difficult dirt often can be removed by rubbing gently with a white plastic drafting eraser. Brush away the crumbs with a soft brush.

In the past, leather books were often oiled to improve their feel and appearance. Unfortunately this can also cause stains, make the leather sticky, and degrade paper. Recent tests have shown that dressings are only cosmetic and do nothing to prolong the life of the leather. Consult a conservator before using dressings on books.

## EMERGENCIES AND MINOR DISASTERS

If books get wet, the affected material needs to be stabilized as

rapidly as possible to avoid further damage. Mold growth is likely if the temperature is over 70 degrees and the relative humidity is over 60 percent for more than 48 hours. Wet books may be frozen to stabilize them; they can be thawed and dried at a later time. Wrap individual books in paper or interleave large numbers of books with paper. Pack each book's spine down in waterproof containers or cardboard boxes lined with plastic. Freeze the books as rapidly as possible in a commercial freezer, a home freezer (for a few books), or outdoors if conditions are right. There are commercial companies that specialize in the salvage and treatment of books in large-scale water disasters.

Small numbers of wet books can be air-dried. The books should be stood up, fanned open, alternating spine to fore edge, with sturdy bookends at each end to prevent them from falling over like dominoes. Use fans to circulate the air and increase evaporation. Drop the room temperature as low as practical to discourage mold and use dehumidifiers or air conditioners to reduce the humidity. Books are dry when they feel warm to the touch. Once dry, place them flat with a weight on top to minimize warping. Most books air dry satisfactorily although some residual staining and distortion is to be expected. Unfortunately, clay-coated (glossy) paper will stick together irreversibly unless the pages are separated while the book is still wet. Interleave every wet page with absorbent paper; repeat the process (exchanging the wet paper for dry) until the pages no longer cling to each other. Stand the book up and fan it open to finish drying completely.

## WHEN TO CONSULT A CONSERVATOR

Problems that are beyond an owner's capabilities should be referred to a conservator. Visit AIC's Find a Conservator at [www.conservation-us.org](http://www.conservation-us.org) to find a qualified conservator in your area.

## ABOUT AIC

The American Institute for Conservation of Historic and Artistic Works (AIC) exists to support the conservation professionals who preserve our cultural heritage. AIC plays a crucial role in establishing and upholding professional standards, promoting research and publications, providing educational opportunities, and fostering the exchange of knowledge among conservators, allied professionals, and the public. AIC's 3,500 members all share the same goal: to preserve the material evidence of our past so we can learn from it today and appreciate it in the future.

To learn more about AIC or to become a member, please visit [www.conservation-us.org](http://www.conservation-us.org).

*The recommendations in this document are intended for guidance only. AIC does not assume responsibility or liability.*

American Institute for Conservation of Historic & Artistic Works (AIC)

1156 15th Street NW, Suite 320 • Washington, DC 20005 • PH: (202) 452-9545 • FX: (202) 452-9328 • [info@conservation-us.org](mailto:info@conservation-us.org) • [www.conservation-us.org](http://www.conservation-us.org)

## EMERGENCY MANAGEMENT

### 3.7 Emergency Salvage of Wet Photographs

**Gary Albright**

**Senior Paper/Photograph Conservator**

**Northeast Document Conservation Center**

Because of the number of photographic processes and their wide variety, responsible advice for the emergency salvage all kinds of wet photographs is difficult to provide. Some processes can withstand immersion in water for a day or more, whereas others would be permanently disfigured or even destroyed by a couple of minutes of exposure. In general, wet photographs should be air dried or frozen as quickly as possible. Once they are stabilized by either of these methods, there is time to decide what course of action to take.

Ideally, salvage should occur under the supervision of a conservator who can minimize damage to a collection if he or she can direct the salvage and treat the collection immediately after the damage has occurred. Time is of the essence: the longer the period of time between the emergency and salvage, the greater the amount of permanent damage that will occur.

#### **Minimize Immersion Time**

Photographs in water will quickly deteriorate: images can separate from mounts, emulsions can dissolve or stick together, and staining can occur. Mold can grow within 48 hours at 60% relative humidity and 70°F, and it often causes permanent staining and other damage to photographs. For these reasons photographs need to be dried as quickly as possible. If photographs cannot be dried they should be frozen.

#### **Salvage Priorities for Wet Photographs**

In general, films (plastic-based materials) appear to be more stable than prints (paper-based materials); therefore, prints should be salvaged first. Important exceptions include deteriorated nitrate and safety films, which are extremely susceptible to water damage.

Photographs made by the following processes should be salvaged first: ambrotypes, tintypes, collodion wet plate negatives, gelatin dry plate negatives, lantern slides, deteriorated nitrate or safety film, autochromes, carbon prints, woodburytypes, deteriorated or unhardened gelatin prints, and color materials. Photographs made by many of these processes will not survive immersion.

Photographs that are more stable in water include: daguerreotypes, salted paper prints, albumen prints, collodion prints, platinum prints, and cyanotypes.

#### **Air Drying Photographs**

If personnel, space, and time are available, photographs can be air dried.

Separate photographs from their enclosures, frames, and from each other. If they are stuck together or adhered to glass, set them aside for freezing and consultation with a conservator.

Allow excess water to drain off the photographs.

Spread the photographs out to dry, face up, laying them flat on an absorbent material such as blotters, unprinted newsprint, paper towels, or a clean cloth.

Keep the air around the drying materials moving at all times. Fans will speed up the drying process and minimize the risk of mold growth.

Negatives should be dried vertically. They can be hung on a line with plastic clips placed at the edges.

Photographs may curl during drying. They can be flattened later.

### **Freezing Photographs**

If immediate air drying of photographs is not possible or if photographs are stuck together, freeze them.

Wrap or interleave photographs with waxed paper before freezing.

Interleave or wrap individual photographs or groups of photographs before freezing with a non-woven polyester material or waxed paper. This will make them easier to separate when they are eventually treated.

### **Drying Frozen Photographs**

Frozen photographs are best dried by thawing, followed by air drying. As a stack of photographs thaws, individual photographs can be carefully peeled from the group and placed face up on a clean, absorbent surface to air dry.

Vacuum thermal drying, where the frozen material is thawed and dried in a vacuum, is not recommended for photographs. Gelatin photographs undergoing this procedure have a tendency to mottle severely and stick together.

Photographs can be vacuum freeze dried; in this process no thawing occurs. Gelatin photographs may mottle during the procedure, but they will not stick together.

Wet collodion glass plates must never be freeze dried; they will not survive. This is also true for all similar collodion processes such as ambrotypes, collodion lantern slides, and tintypes.

### **Salvaging Slides**

Slides can be rinsed and dipped in a water/Photo-flo mixture, slide cleaner, or a similar commercial product and air dried; preferably they should be hung on a line or propped on edge.

Ideally, slides should be removed from their frames for drying and then remounted.

Slides mounted between glass must be removed from the glass or they will not dry.

### **Call a Qualified Conservator**

Dried or frozen photographs are reasonably stable. Store them until you can talk to a conservator who has experience with photographs and can advise you of treatment needs.

Emergency Management  
3.8 Emergency Salvage of Moldy Books and Paper

**Beth Lindblom Patkus**  
**Preservation Consultant**  
**Walpole, MA**

### **Introduction**

Most librarians and archivists have seen the effects of mold on paper materials, but many have never experienced an active mold outbreak. Dealing with such an outbreak (large or small) can be overwhelming. This leaflet provides some basic information about mold and outlines the steps that need to be taken to stop mold growth and begin to salvage collections.

Please note that the actions recommended here are basic stabilization techniques to be undertaken in-house for small to moderate outbreaks. The complexities of dealing with a large number of wet and moldy materials will usually require outside assistance, and some suggestions for dealing with a major mold outbreak, appear at the end of this leaflet. In all cases, a conservator or preservation professional should be consulted if any questions arise or if further treatment is necessary.

### **What is Mold?**

Mold and mildew are generic terms that refer to various types of fungi, microorganisms that depend on other organisms for sustenance. There are over 100,000 known species of fungi. The great variety of species means that patterns of mold growth and the activity of mold in a particular situation can be unpredictable, but it is possible to make some broad generalizations about the behavior of mold.

Mold propagates by disseminating large numbers of spores, which become airborne, travel to new locations, and (under the right conditions) germinate. When spores germinate, they sprout hair-like webs known as mycelium (visible mold); these in turn produce more spore sacs, which ripen and burst, starting the cycle again. Molds excrete enzymes that allow them to digest organic materials such as paper and book bindings, altering and weakening those materials. In addition, many molds contain colored substances that can stain paper, cloth, or leather. It is also important to realize that mold can be dangerous to people and in some cases can pose a major health hazard. Mold outbreaks should never be ignored or left to "go away on their own."

### **Why Does Mold Grow?**

To germinate (become active), spores require a favorable environment. If favorable conditions are not present, the spores remain inactive (dormant); in this state they can do little damage.

The most important factor in mold growth is the presence of moisture, most commonly in the air, but also in the object on which the mold is growing. Moisture in the air is measured as relative humidity (RH). In general, the higher the RH the more readily mold will grow. If the RH is over 70% for an extended period of time, mold growth is almost inevitable. It is important to remember, however, that it is possible for some species of mold to grow at lower RH as well. If collections have become wet as the result of a water disaster, this increases their susceptibility to mold growth. Other factors that will contribute to mold growth in the presence of moisture are high temperature, stagnant air, and darkness.

Mold spores, active or dormant, are everywhere. It is not possible to create an atmosphere free of spores. They exist in every room, on every object in the collection, and on every person entering the collection area. The only wholly dependable control strategy is to keep the humidity and temperature moderate so the spores remain dormant, keep collections as clean as possible, and prevent the introduction of new active mold colonies.

### **Basic Principles of Salvage**

**Reduce the humidity:** As noted above, moisture initiates mold growth. Reducing the humidity is essential to stopping the mold growth.

**Do not turn up the heat:** This will not help to dry out collections and storage areas. Additional heat in the presence of moisture will cause the mold to grow faster.

**If collections are wet, dry or freeze them:** Mold will normally grow on wet materials in about 48 hours (sometimes sooner). If you know you cannot get the affected material dry within 48 hours, it is best to freeze it. This will not kill the mold, but it will stop further growth until you have a chance to dry and clean the material.

**Consider the health risks:** A few mold species are toxic to people, and many molds are powerful sensitizers. Exposure to mold can lead to debilitating allergy even among people not prone to allergies. Everyone who works with moldy objects must be properly protected.

**Avoid "quick and easy" cures:** "Quick cures" that you may have heard about (such as spraying Lysol on objects or cleaning them with bleach) may cause additional damage to items or be toxic to people; they are also often ineffective. In the past, mold-infested collections were often treated with fumigants. Ethylene oxide (ETO) will kill active mold and mold spores; other chemicals that have been used are less effective. All of these chemicals can have adverse effects on both collections and people, and none of them will keep the mold from recurring.

### **Step-by-Step Salvage**

This section provides specific steps for responding to a small or moderate mold outbreak. While the steps are numbered for convenience, they may not be carried out in exactly this order, and some of these activities will occur simultaneously.

1. Find out what is causing the mold growth. You need to know what is causing the problem so that additional mold on collections not yet affected can be avoided.
  - Look first for an obvious source of moisture, such as a water leak.
  - If there is no obvious source of moisture, use a monitoring instrument to measure the relative humidity in the affected area. If the humidity is elevated, there might be a problem with the HVAC (heating, ventilating, and air conditioning) system, or the area might be subject to higher humidity for another reason, such as having shelves placed against an outside wall. Mold might also develop in areas with poor air circulation or in areas where there is a lot of dust and dirt that might provide a food source for mold.
  - Initiate repairs or resolve the problem as soon as possible. If the problem cannot be resolved quickly, salvage the collections as directed below and develop a strategy for frequent monitoring of the area for additional mold growth.
2. Take steps to modify the environment so that it is no longer conducive to mold growth.
  - Mop up and/or use a wet-dry vacuum to remove any standing water. Bring in dehumidifiers, but be sure that a mechanism is in place to drain them periodically so they do not overflow. Bring in fans to circulate the air, and open the windows (unless the humidity is higher outside).
  - Your goal should be to reduce the relative humidity to 55% or lower. Temperature should be moderate, below 70°F. Get a monitoring instrument that can measure the relative humidity and temperature accurately, and record the measurements in a log several times a day. Do not rely on your own impression of climate conditions.
3. Implement safety precautions for staff and others working with moldy items.
  - A mycologist should be consulted to insure that no toxic mold species are present (a local hospital or university should be able to provide a reference). If toxic molds are present, DO NOT attempt to salvage materials yourself.
  - If there are no toxic molds present, collections can be salvaged in-house, but everyone working with the affected materials must wear disposable plastic gloves and clothing, and use a protective mask when working with moldy objects.
  - Use a respirator with a HEPA (high efficiency particulate) filter; pollen dust masks available in drug and hardware stores are not adequate. If you cannot use disposable clothing, be sure to leave dirty clothes in a designated area and wash them in hot water and bleach. Respirators should be wiped periodically with rubbing or denatured alcohol.
  - Be aware that some people cannot wear respirators. The respirator must fit well with good contact around the nose and mouth area. In addition, they

make breathing somewhat difficult and can be problematic for people with asthma or heart conditions, or people who are pregnant. It is a good idea to consult your doctor before wearing a respirator to work with moldy materials.<sup>1</sup>

4. Isolate the affected items.
  - o Quarantine items by removing them to a clean area with relative humidity below 45%, separate from the rest of the collection. Items should be transferred in sealed plastic bags to avoid transfer of mold to other items during the move, but they should not remain in the bags once in the clean area, since this will create a micro-environment that can foster further mold growth.
  - o In the case of a large mold outbreak it may be impractical to move the items; in that case the area in which they are housed should be quarantined and sealed off from the rest of the building to the extent possible (remember that this includes shutting off air circulation from the affected area).
5. Begin to dry the materials. Your goal is to make the mold go dormant, so that it will appear dry and powdery rather than soft and fuzzy. This will allow you to remove the mold residue more easily.
  - o Wet material should be dried in a cool, dry space with good air circulation. An air-conditioned space is the best for this purpose, but if that is impossible, use fans to circulate air (do not aim fans directly at objects, however, as this can damage materials and further scatter mold spores). Place paper toweling or unprinted newsprint (regular newspapers may transfer print to the wet objects) under the drying items to absorb moisture, and change this blotting material often. Air drying takes time and attention, since you must check drying materials often, and you must maintain cool, dry conditions and air circulation in the space.
  - o Collections may also be dried outside in the sun (sunlight or ultraviolet light can cause some molds to become dormant). The outside humidity must be low. Be aware that the sun causes fading and other damage to paper-based collections, however. Materials should be monitored closely and left outside no more than an hour or so.
  - o Special attention should be paid to framed objects (such as prints and drawings) and to the interior of the spines of books. A frame provides an ideal environment for mold; the back is dark, air does not circulate, and humidity can be trapped inside. Similarly, the interior of the spine of a book is particularly vulnerable to mold growth. Spines should be checked regularly during the drying process. Framed materials should be unframed immediately, and dried as above. If the item appears to be stuck to the glass in the frame, remove the backing materials from the frame and leave the item in the frame and attached to the glass. Place the framed item in a cool, dry space as described above, and consult a professional conservator.
6. If immediate drying is not possible, freeze the affected items.

- If the item is small enough, it can be placed in the freezer compartment of a home refrigerator, with freezer paper loosely wrapped around it to prevent it from sticking to other items.
  - For items that are too big for a freezer compartment or for larger numbers of items, a commercial freezer may be necessary (grocery store, university food service, commercial cold storage facility, etc.). It is a good idea to make arrangements for commercial freezer storage before an emergency arises, since there may be restrictions on storing moldy items in a freezer that normally holds foodstuffs.
  - Once time and resources are available, frozen materials can be thawed and dried in small batches, or they can be freeze-dried or vacuum freeze-dried (with the exception of photographs, which should not be freeze-dried or vacuum freeze-dried).
7. Clean the affected items. ***Do not*** try to clean active mold (soft and fuzzy) yourself. This should be done only by a conservator, who will use a vacuum aspirator to avoid further embedding the mold into the paper. The following instructions apply only to inactive (dry and powdery) mold and materials that do NOT have artifactual value:<sup>2</sup>
- Remove mold residue outdoors rather than in an enclosed space whenever possible. Be sure to wear protective gear (see above). If you must work indoors, use a fume hood with a filter that traps mold or in front of a fan, with the fan blowing contaminated air out a window. Close off the room from other areas of the building (including blocking the air circulation vents).
  - Vacuum the mold. Use a vacuum with a HEPA filter; this will contain the mold spores. A normal vacuum will simply exhaust the spores out into the air. You can also use a wet-dry commercial-strength vacuum if the tank is filled with a solution of a fungicide such as Lysol diluted according to the label instructions. A tube from the hose inlet should extend into the solution so that incoming spores are directed there.
  - Do not vacuum fragile items directly, since the suction can easily cause damage. Papers can be vacuumed through a plastic screen held down with weights. A brush attachment covered with cheesecloth or screening should be used for books to guard against loss of detached pieces. Boxes can be vacuumed directly. When disposing of vacuum bags or filters, seal them in plastic trash bags and remove them from the building.
  - It is also acceptable to clean off mold with a soft brush, but this must be done carefully. Once moldy material is dry and the residue appears powdery, take a soft, wide brush (such as a watercolor wash brush) and lightly brush the powdery mold off the surface of the item. This should be done outside or the mold should be brushed into a vacuum nozzle. Be careful not to rub the mold into the surface, since that will attach it permanently to paper fibers or the cover of a book.
8. Dry and thoroughly clean the room(s) where the mold outbreak occurred. You may do this yourself or hire a company to provide dehumidification and/or cleaning.

- Vacuum shelves and floors with a wet-dry vacuum filled with a fungicide solution such as Lysol, then wipe them down with Lysol or a similar solution. Allow them to dry fully before returning any materials. If a musty odor lingers in the room, open containers of baking soda may help.
  - It is also a good idea to have the HVAC system components (heat-exchange coils, ductwork, etc.) cleaned and disinfected, particularly if you suspect they have caused the problem.
9. Return materials to the affected area. Do this *only* after the area has been thoroughly cleaned *and* the cause of the mold outbreak has been identified and dealt with.
10. Continue to monitor conditions and take steps to avoid additional mold growth.
- Take daily readings of temperature and relative humidity, and be sure that the climate is moderate. It is particularly important to keep humidity below 55% to insure that mold will not reappear. Temperature should not exceed 70°F.
  - Check problem areas frequently to insure that there is no new mold growth. Be sure to examine the gutters of books near the endbands and inside the spines.
  - Keep areas where collections are stored and used as clean as possible, since dust and dirt are a source of spores, both active and dormant. Clean floors with a HEPA filter vacuum rather than sweeping, since sweeping scatters dust. House collections in protective enclosures whenever possible to keep them free of dust. Vacuum shelves and the tops of unboxed, shelved books, or clean them with a magnetic wiping cloth.
  - If funds permit, install a multi-stage particulate filtration system in the building or storage area.
  - Keep windows closed to prevent active spores from entering, and prohibit live plants in collection storage or use areas, since these are also a source of spores.
  - Quarantine new acquisitions for a few days, and check them carefully for signs of mold.
  - Avoid storing collections in potentially damp areas or in locations where water accidents are possible. Insure that regular maintenance is carried out on the building to reduce the chance of water emergencies.
  - Regularly inspect the HVAC system, which is a good breeding ground for mold. Regularly clean the heat exchange coils, drip pan, and ductwork. Change air filters frequently.
  - Prepare a disaster plan. This will prevent some accidents and provide strategies for dealing quickly and effectively with problems. Be sure that all employees are familiar with the plan.

### **Dealing with a Major Mold Outbreak**

If a large portion of the collection is affected by the mold outbreak, if dangerous species of mold are present, or if the HVAC system and the building itself are also infected with mold, outside assistance will be needed. Particularly in the latter cases, it is essential to

make sure that the building is safe for occupancy by staff. There are a variety of companies experienced in working with cultural collections that can assist institutions with recovery.

Most of the disaster recovery companies that provide drying services will also clean surface mold off collections. Conservators or regional conservation centers provide treatment services for individual items with artifactual value.

There are also several disaster recovery companies that specialize in dehumidifying and cleaning of buildings. In the case of a severe infestation of mold and/or an infestation that poses serious health risks to staff, companies specializing in indoor air quality can help to insure that the building is safe for occupancy. In severe cases, fumigation of the affected area may be necessary. Due to the potential for damage, fumigants should not be used directly on or in the presence of collections unless there is no other choice. Fumigation should always be done by a licensed professional.

A list of service providers is given at the end of this leaflet. Be sure that the company you choose is familiar with the requirements of cultural collections. If you are not sure how to choose a service provider, always contact a conservator or preservation professional for advice.

### **Summary**

Spores, active or dormant, are ubiquitous. Although it is impossible to get rid of all the spores, mold growth can be controlled. Most important for mold control is maintaining RH conditions below 55%, or, better, below 45%. Use of protective enclosures, meticulous housekeeping, monitoring of RH and temperature, and a watchful eye are also important. If resources allow, high-level filtration of storage areas, if not of the whole building, is recommended. Protecting library and archival collections from water accidents should be among the highest priorities for any institution. Wet collections must be immediately dried or stabilized by freezing. Moldy materials must be isolated, dried if wet, then cleaned using the strictest precautions.

### **Further Reading**

Chamberlain, William R. "A New Approach to Treating Fungus in Small Libraries." *Abbey Newsletter* 15.7 (November 1991): 109.

- A practical article describing the response to a mold outbreak and the preventive measures that were subsequently undertaken at the Virginia State Library. Available online at <http://palimpsest.stanford.edu/byorg/abbey/>.

"Mold As a Threat to Human Health." *Abbey Newsletter* 18.6, (Oct 1994).

- A short article on mold as a workplace hazard for library and archival workers. Summarizes articles relevant to the subject and anecdotes from the field. Available online at <http://palimpsest.stanford.edu/byorg/abbey/>.

Nyberg, Sandra. *Invasion of the Giant Spore*. SOLINET Preservation Program Leaflet Number 5 (Atlanta, GA: Southeastern Library Network, 1987), 19 pp.

- An updated version of this leaflet (emphasizing preventive activities and non-chemical treatments) is available from SOLINET on its web page at [http://www.solinet.net/preservation/leaflets/leaflets-fs.cfm?leafletpgname=leaflets\\_templ.cfm?doc\\_id=122](http://www.solinet.net/preservation/leaflets/leaflets-fs.cfm?leafletpgname=leaflets_templ.cfm?doc_id=122) or from Alicia Riley-Walden, Preservation Administrative Assistant, SOLINET Preservation Services, 1438 West Peachtree Street, NW, Suite 200, Atlanta, GA 30309-2955 (e-mail: [alicia\\_riley-walden@solinet.net](mailto:alicia_riley-walden@solinet.net) or [ariley@solinet.net](mailto:ariley@solinet.net)). The older version of the leaflet gives a good summary of mold prevention and treatment, and also presents detailed information on various chemical treatment methods that in most cases would no longer be recommended.

Price, Lois Olcott. *Managing a Mold Invasion: Guidelines for Disaster Response*. Philadelphia, PA: Conservation Center for Art and Historic Artifacts, 1996. CCAHA Technical Series No. 1.

- An excellent summary of response and recovery techniques. Includes a good bibliography that cites articles on the effects of fumigation on collections. Available from CCAHA, 264 South 23rd Street, Philadelphia, PA, 19103; (215) 545-0613, fax (215) 735-9313, or e-mail [CCAHA@shrsys.hslc.org](mailto:CCAHA@shrsys.hslc.org).

## **Preserving Your Family Archives: Resource List**

### Further Reading

Davis, Nancy. *Handle with Care: Preserving Your Heirlooms*. Rochester: Rochester Museum and Science Center, 1991.

Heritage Preservation, ed. *Caring for Your Collections: Preserving and Protecting Your Art and Other Collectibles*. New York: Harry N. Abrams, Inc., 1992.

Long, Jane and Richard W. Long. *Caring For Your Family Treasures: A Concise Guide to Caring for Your Cherished Belongings*. New York: Harry N. Abrams, Inc., 2000.

Northeast Document Conservation Center- Preservation Leaflets- Resources for Private and Family Collections

<http://www.nedcc.org/resources/leaflets.introduction.php>

Reilly, James. *Care and Identification of 19th-century Photographic Prints*. Rochester: Eastman Kodak Company, 1986.

Taylor, Maureen A. *Uncovering Your Ancestry through Family Photographs*. Cincinnati: Family Tree Books, 2005.

### Conservators

American Institute for Conservation (AIC)

Provides free referral service for conservators in your area

1-202-452-9545

[info@aic-fac.org](mailto:info@aic-fac.org)

<http://www.conservation-us.org/>

### Suppliers

Gaylord Bros.

PO Box 4901

Syracuse, NY 13221-4901

1-800-962-9580

<http://www.gaylordmart.com/>

Hollinger Metal Edge Inc.

6340 Bandini Ave.

Commerce, CA 90040

1-800-862-2228

<http://www.metaledgeinc.com/>

Light Impressions

PO Box 2100

Santa Fe Springs, CA 90670

(800) 828-6216

<http://www.lightimpressionsdirect.com/>

University Products

800-628-1912

<http://www.universityproducts.com>