



# TECH TALK

## This issue: Photographs • Part I



In this issue, Bonnie Wilson, curator of Sound and Visual Collections at the Minnesota Historical Society (MHS), discusses the fundamental aspects of preserving photographs and the basic issues involved in archival work with photographic negatives.

In Part II, which is planned for the Tech Talk section of the July Interpreter, she will talk about working with photographic prints. She will be joined by Eric Mortenson, MHS staff photographer, who will discuss the fundamentals and pros and cons of preserving historically valuable photographs by the process of digitization.

## Basic Care of Photographic Materials by Bonnie Wilson



### The photograph: a multi-faceted object

From the time of its invention in 1839, the photograph has been made of a multitude of materials: silver, iron, glass, paper, plastic, salts, dyes, and gelatin, to name just a few. Since each of these materials has characteristics that must be attended to, the task of preserving photographs becomes a bit more challenging than the simplicity of the photograph implies.

#### The Components

Most photographic prints and negatives are made up of three parts: a primary support material, a binder, and a final image material. (see diagram below). Some primary support materials are more stable than others; you should identify them because they strongly influence the condition of the print or negative.

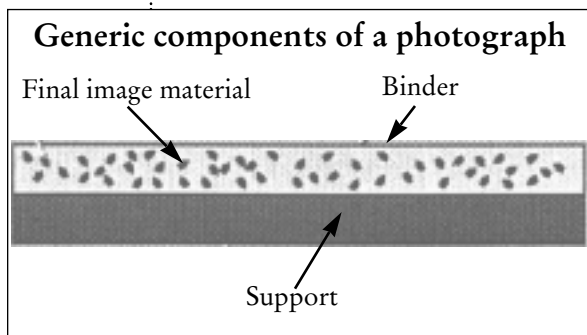


Diagram by James Reilly, Image Permanence Institute

During the early history of photography (1840-1855), the primary support materials were metal or paper, and the resulting photographs were called *daguerreotypes* and *salted paper*

*prints*. Experimentation and discovery characterize the second half of the 19th century, and many new photographic materials were invented, but metal, glass and paper are the most typical support media prior to 1890. For example, *tintypes* are images on iron, *ambrotypes* are images on glass, and *albumen prints* are images on paper. Negatives were

predominantly on glass until the *plastic* flexible film negative was introduced to facilitate rolling film.

The first flexible film support material was *nitrate* film, introduced in both the amateur and commercial markets in 1889. The plastic flexible film called *acetate* entered the market around 1920 and was the most common support material until *polyester* film was introduced in the mid-1950s.

Glass negatives are subject to cracking and breaking, but otherwise they are on a very stable support base. Plastic negatives, both nitrate and acetate, are another matter. Plastic support material buckles, shrinks, changes color, and gives off odors. Negatives must be checked periodically for physical changes—primarily appearance and smell. If the negatives do not lay perfectly flat or if they have an obnoxious odor, deterioration has begun. Upon showing signs of deterioration, any nitrate or acetate negative should be segregated from stable film.

Besides the support material, photos and negatives are composed of a binder and final image material. For most of the 19th century, *collodion* was the primary binder for negatives, and *albumen* was the primary binder for prints. Beginning in the 1870s, most prints and negatives used *gelatin* as a binder. For most black and white images, throughout the 19th and 20th centuries, the final image material was *silver*. Of course, there were many variations on the contents of this open-face sandwich, but most archives staff are dealing with collodion or gelatin negatives and albumen or gelatin silver prints in their black and white collection.

**Editor's note:** TECH TALK is a bimonthly column offering technical assistance on management, preservation, and conservation matters that affect historical societies and museums of all sizes and interests. We welcome comments and suggestions for future topics.



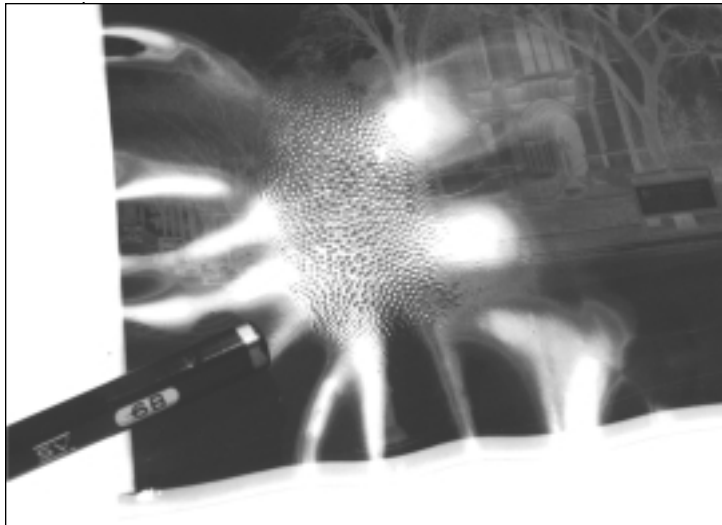
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### Color

Color negatives and prints introduce new elements into the preservation equation. In addition to glass, plastic, and paper supports, color images are composed of dyes, all of which fade. It is beyond the scope of this paper to describe the chemistry and process of color imaging. However, all archives staff should be aware that color fades much faster than black and white, and requires more resources to preserve.



*The photograph above shows a deteriorating acetate negative. See the discussion on p. 5.*

### Surveying the Collection

Before you spend time and money on any photo collection, you should assess what you have. Ask such questions as:

- Approximately how many negatives and prints are in the collection? How many negatives are glass, nitrate, acetate, polyester? How many black and white or color prints?
- How many photo albums?
- Which items are most in need of attention because they are deteriorating?
- Which negatives need to be printed for access?
- Which items are the most important in terms of your collecting policy?
- Which items are most likely to interest your researchers?

The answers to these questions will help you develop a work plan to begin your preservation activities.

One thought to keep in mind: An unidentified image is far less valuable than one that is fully identified. As you assess your collection, start planning how you might acquire identification for

some items. The unidentified ones should be considered less worthy of your time and money. You may eventually have to let them go.

### The Environment

The most influential factors in photo preservation are the storage and display environments. If these are not controlled, there is no point in spending money on storage materials, cataloging, or any other photo collection management activities.

The American National Standards Institute (ANSI) recommends 68° F and 30-40 percent relative humidity (RH) as base line environmental conditions. If the archive can be held at that humidity level and go lower in storage temperature, all the better.

Though cooler storage is seldom affordable for the entire photo collection, the archive may be able to purchase refrigeration units for color materials and important nitrate and acetate negatives. Cold storage must be accompanied by special packaging. (See the "Safe Care Image Archive Freezer Kit" in the Metal Edge Catalog, in the list of catalogs on p. 6, below.)

### Light

Photographs are produced as a result of the action of light on the final image material in the photograph. It should be no surprise, then, that light has a great effect on the life span of the photograph, no matter what its composition. Collection caretakers must decide how to "spend" the time a photograph can be exposed to light. Black and white photos have more to spend than color, but they, too, will fade. As a general rule, a photograph should spend no more than one year on display, even in somewhat dimmed (50 lux) light. It should never be displayed in direct sunlight which is high in the ultraviolet (UV) range. Even fluorescent lights are high in UV, requiring filters for display environments. For permanent displays, a copy photo is always preferable to the original vintage photo.

### Basic care of negatives

Next to environmental control, the most important photographic preservation activity is caring for negatives and transparencies. They are the camera originals, the photographic material that came out of the camera.

The first step in negative preservation is the determination of what kind of negatives the archive holds. The majority of negatives in historical



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collections are nitrate and acetate, which are both in danger of deterioration. A product called “A-D strips” can help in detecting the beginning stages of acetate deterioration. (See the list of readings.)

### Identification of negative film support material

The support material of any negative can be determined by examination and chemical testing. Define first by examination. Polyester negatives are easy to identify with polarizing filters that can be purchased in photo supply stores. Place two filters so they are at cross axes to one another, allowing no



MHS collections; photograph by Eric Mortenson

Above: polarizing filters with a negative in between.

Right: a four-flap negative enclosure

light to pass through them. Put the negative in question between them. A polyester negative will show red and green interference colors like those seen on soap bubbles.

If your negative is not polyester, look for words printed on the edge, the approximate date of the negative, and certain types of deterioration. Some nitrate negatives have “nitrate” printed on the edge. Acetate and polyester negatives will say “safety,” meaning that they are not the fire hazard that nitrate negatives can be. If your negative was made before 1920, it is nitrate, even if that word is not printed on the edge. If it was made after 1955, it is either acetate or polyester. Although polyester-based negatives were commonly used after 1955, they are manufactured for professional photographers in 4" x 5" and larger formats. Today, almost all 35mm and 120 format film is still on an acetate base.

You can tell if you have deteriorating nitrate or acetate by giving it the sniff test. If it smells

obnoxious, like dirty socks, it is deteriorating nitrate. If the negative smells like vinegar or its emulsion is bubbled or wrinkled into channels, it is deteriorating acetate. (See illustration on p. 4.)

There is a chemical test for nitrate that is effective, but somewhat hazardous. You can read about it in detail in Fischer and Robb’s *Guidelines for Care and Identification of Film-base Photographic Materials*. (See the full citation in the list of recommended readings on page 6, below.)

### Storage

All paper and board materials for negatives and prints must pass a “Photo Activity Test,” or “PAT,” to be truly archival. The ANSI created this test to define good photo storage material. It is not sufficient to purchase “acid-free” materials. PAT-tested materials available through the catalogs listed on p. 6, below.

### Glass Plates

Glass plate negatives should be housed in four-flap negative enclosures. The flaps fold over the negative without abrading, or rubbing against, it. The most common problem with glass plate negatives is peeling emulsions (binder and image material). Four flaps do not exacerbate this problem. The flap enclosure allows for examination and even printing without sliding the negative in and out of a sleeve. Once covered, the negatives should be stored on edge



MHS collections; photograph by Eric Mortenson

in sturdy PAT-tested boxes. Boxes full of glass plate negatives are heavy, so they should be stored on very strong shelving and have “heavy” labels on them to warn the person taking the box off the shelf. Most glass plate negative destruction occurs during a move or at the time of printing.



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### Nitrate, Acetate and Polyester Negatives

Nitrate negatives should be stored in PAT-tested paper sleeves, never in plastic of any kind. The plastic will hold and accelerate the action of the gasses given off as the negative decomposes. Whenever feasible, all nitrate negatives should be stored separately from acetate and polyester negatives in separate boxes or even separate rooms.

Acetate negatives produced before 1960 should be stored in PAT-tested paper sleeves, and not in plastic. Most archives staff feel comfortable with storing newer acetate negatives, which are primarily triacetate as opposed to diacetate, in polyethylene or polyester sleeves. The newer ones are especially convenient for 35mm and 120 format negatives, since they can be stored in pages divided into channels or rows for easy examination and use. When in doubt, use a PAT-tested paper enclosure and skip the plastic. Always wear white gloves for handling negatives, especially if you have decided not to store them in plastic.

Negatives showing signs of deterioration should be immediately segregated from stable negatives. They give off gases that will make the healthy negatives deteriorate sooner. Nitric acid, a product of deteriorating nitrate negatives, affects other nitrate and acetate negatives, softens the gelatin binder, and fades silver images. Put these negatives in separate boxes in a separate storage area. As soon as possible, deteriorating negatives should be copied onto new polyester film, if extremely valuable, or printed by professionals using archival print standards.

### Transparencies

Transparencies, called slides in 35mm format, are also camera originals and most vulnerable to dust and fingerprints. Store them in polypropylene, polyethylene or polyester sleeves. They can also live in carousel trays stored in boxes, but that can take up precious space.

When handling negatives or slides, wear clean white cotton gloves, and work in a clean, well-ventilated area. Deteriorating negatives can be harmful to your health, so you should be especially

vigilant about good air circulation, and you should limit the time you are exposed to the negatives. A respirator mask should be considered when working with badly deteriorated nitrate negatives.

### Recommended reading

- Fischer, Monique C., and Andrew Robb. *Guidelines for Care and Identification of Film-Base Photographic Materials*. Newark, Del.: University of Delaware/Winterthur Museum Art Conservation Program, 1993.
- Image Permanence Institute. *Storage Guide for Acetate Film*. Rochester, N.Y.: Image Permanence Institute, 1993.
- Image Permanence Institute. *A-D Strips*.
- Keefe, Laurence E. Jr. and Dennis Inch. *The Life of a Photograph*. Boston: Focal Press, 1990.
- Reilly, James M. *Care and Identification of 19th-Century Photographic Prints*. Rochester, N.Y.: Eastman Kodak Co., 1986.
- Ritzenthaler, Mary Lynn, Gerald J. Munoff, and Margery S. Long. *Administration of Photographic Collections*. Chicago: Society of American Archivists, 1984.
- Wilhelm, Henry and Carol Brower. *The Permanence and Care of Color Photographs*. Grinnell, Iowa: Preservation Publishing Company, 1993.

### Free catalogs and brochures

- "Caring for Your Photographs," The American Institute for Conservation of Historic and Artistic Works. (202) 452-9545
- Gaylord Bros., Syracuse, N.Y. 1-800-448-6160
- Gaylord Preservation Pathfinder No. 3, "Archival Storage of Photographic Materials." 1-800-448-6160
- Light Impressions, Rochester, N.Y. 1-800-828-6216
- Metal Edge, Inc., Los Angeles, Calif., 1-800-862-2228
- University Products, Holyoke, Mass. 1-800-628-1912

**Bonnie Wilson**, curator of Sound and Visual Collections, has cared for the photography, film, videotape, and recorded sound collections at the Minnesota Historical Society since 1972. She has a degree in Library Science, and has gained further knowledge through the Society of American Archivists and the Association of Moving Image Archivists. A workshop through The Rochester Institute of Technology, "Preserving Photographs in a Digital World," aided her in writing this article. She can be reached at (612) 296-1275 or [bonnie.wilson@mnhs.org]. She gratefully acknowledges the assistance of Andrew Robb in preparing this article.