CHAPTER 2

Getting The Picture

Preserving Photograph Collections

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This chapter presents a brief overview of some common photographic processes, highlights areas of vulnerability for the various processes, and provides adaptable guidelines for the care and handling of photographic materials and practical solutions for a variety of collections. The goal of the chapter is to emphasize the value and vulnerability of photographs as unique objects, even though photography is a reproductive medium, and to provide reliable resources that can guide readers' decisions as they determine the best possible care for their collections. A list of recommended online and print resources at the end will enable readers to find more detailed information on certain issues.

Understanding Photographic Processes

Most photographs are complex composite structures containing layers of materials that each react differently to various environmental

stresses such as light, humidity, pollution, and temperature. Accurate identification of photographic processes is important because it provides information on their specific vulnerabilities and allows for more targeted preservation planning. This section contains some quick tips for identifying photographic processes, but, for a thorough understanding of processes, one should consult the resources in the References section.

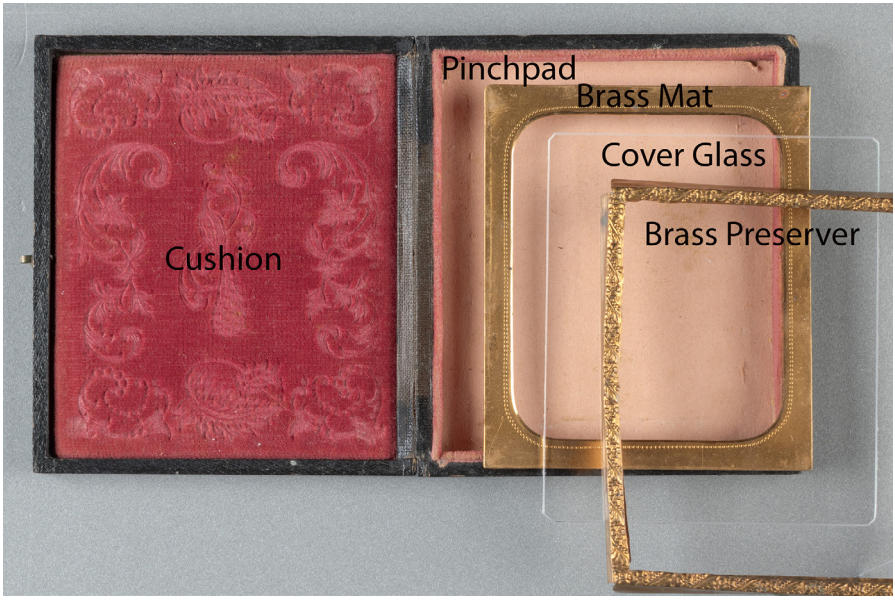

Figure 2.1: An image with labeled elements of a case and plate package that would have housed a daguerreotype, ambrotype, or tintype.

Cased Images

The category of cased images consists of daguerreotypes (in common use from 1839 to 1860), ambrotypes (in common use from 1852 to 1870), and tintypes (in common use from 1853 to 1930). What ties these processes together is that they are all housed in cases, and they are all unique direct positives produced in-camera (no negative is involved). The cases may be made of wood covered in leather, textile, or paper made to look like leather, or they can be made of molded thermoplastic. They have a cloth cushion on the side with the cover and a velvet pinch pad lining the tray side where the plate package is held. Typically, the object will have a brass mat, a cover glass, a metal preserver, and it may also have binding tapes (see Figure 2.1).[1] Many

of the cases and their metal elements were decoratively embossed (Burge 2003). Over time, one or all of these elements may have been removed, replaced, or lost.

The cover glass on all types of cased images is prone to chemical deterioration, which is accelerated in conditions of high humidity. This deterioration is most noticeable as crystalline or liquid deposits on the interior of the glass. This liquid consists of alkaline (high pH) salts and can cause damage to the objects. The preferred solution is to control the humidity and consult with a conservator to see whether the glass can be changed for a more stable modern glass. Until that is possible, storing objects vertically (if the case is intact) or face down will at least prevent the glass deterioration from falling onto the face of the photograph.

Daguerreotypes consist of a silver-coated copper plate support and a silver and mercury amalgam image that is often toned with gold (see Image 2.1). Due to the highly polished silver, it has a mirror-like surface (see Image 2.2) and may appear negative in specular light (see Image 2.3). The surface is easily abraded and prone to tarnishing.

Image 2.1: A cased daguerreotype

Image 2.2: The reflective quality of a daguerreotype

Image 2.3: A daguerreotype in specular light

Ambrotypes consist of a glass support coated with a collodion emulsion that holds the silver image material (see Image 2.4). The ambrotype must be placed on a black background to be read as a positive image. This could be a separate piece of black paper, cloth, or other material; black varnish coated directly on the back of the plate; or colored glass (often called "ruby glass"). The emulsion was usually covered with a clear varnish, and any unvarnished areas will be tarnished.

Image 2.4: A cased ambrotype

Tintypes consist of a lacquered iron support with a collodion emulsion that holds the silver image material (see Image 2.5). Since iron is a malleable support, it may be bent, which can cause the brittle collodion to crack and flake. If exposed to humidity, the iron will form characteristic orange rust. While tintypes can be in cases, they are more commonly found in paper mats or loose, as their supports and images are more robust than those of daguerreotypes or ambrotypes.

Image 2.5: A tintype

Silver Image Print Processes

This category of photographs consists of salted paper prints (in common use from 1840 to the late 1860s), albumen prints (in common use from 1850 to 1910), collodion prints (in common use from 1865 to 1920), and gelatin silver prints (in common use from 1885 to the present). They are all prints on a paper support created from negatives made in a camera. One negative can be used to make multiple prints of the same image.

An important distinction among these prints is how the silver image is formed. In *printed out paper* (POP) processes, it is the action of light alone that forms the image. These processes need long exposures with the sensitized paper in direct contact with the negative. Thus, the print is the same size as the negative. In *developed out paper* (DOP) processes, only a brief exposure is needed to activate the silver forming a latent image, which is made visible through development in a chemical bath. DOP processes need a brief exposure and can use a small negative placed in an enlarger to get a print much larger than the negative. The amount of silver deposited in a DOP is much greater than in a POP, making DOP processes more stable and able to achieve true black tones, whereas POPs tend to have a warm image tone and are more prone to fading over time. Most POPs are toned with gold, which adds greater stability to the silver and a more pleasing image tone. Albumen prints, collodion prints, most salt prints, and some early gelatin prints are POPs. Most gelatin silver prints are DOPs.

Salted paper prints have no binder layer (see Image 2.6). This means that the silver image material sits down in the paper fibers. Under magnification, the fibers will be clearly visible. These prints have warm image tones (unless in perfect condition) and can often be faded. Usually, they have a matte surface, but sometimes they will have an applied coating that alters the surface gloss. They are extremely light sensitive and prone to abrasion.

Image 2.6: A salted paper print with hand applied media

Albumen prints were the most common process of the 19th century (see Figure 2.2). They are similar to salted paper prints but with the important addition of an albumen (egg white) binder layer. The silver image material is deposited in this binder layer, which sits right on top of the paper surface. Paper fibers will still be visible under magnification, but the image is sitting up on top of them rather than down in them as with salted paper prints. The image tones tend to be slightly more yellow than those of salted paper prints, due to the chemical aging of the albumen, and they are prone to fading. The albumen can form a fine network of surface cracks, which give it a characteristic sparkly surface sheen. They have a strong tendency to curl and will usually be mounted to a secondary support board.

Figure 2.2: Three common formats of albumen prints

Collodion and gelatin silver prints have an additional baryta layer applied between the paper and the emulsion. This is a layer of gelatin, usually pigmented white with barium sulfate, that fills in the paper fibers, providing smooth white highlights (see Figure 2.3).

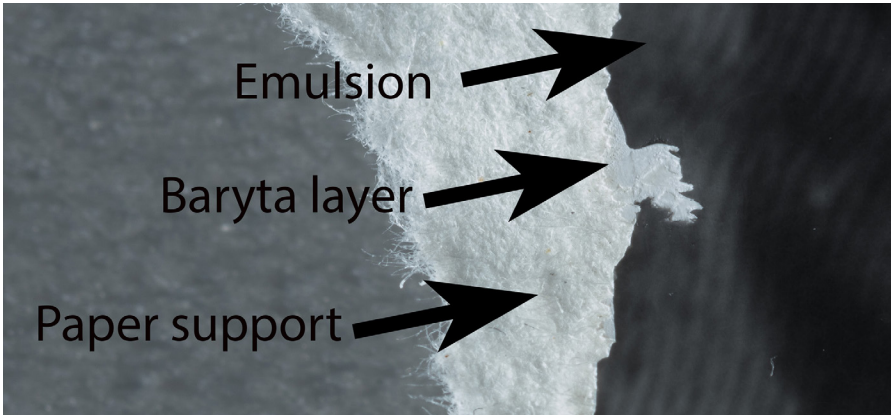

Figure 2.3: Close-up of baryta layer

Collodion prints can be either glossy or matte and were most often toned with gold (see Image 2.7), which gives dark burgundy tones, or platinum (see Image 2.8), which gives neutral image tones.

Collodion is insensitive to humidity so the image material is well protected from moisture and pollutants, but it is quite brittle and can be easily abraded, scratched, or chipped. These prints are also usually mounted to a secondary support board.

Image 2.7: A gold-toned collodion print

Image 2.8: A platinum-toned collodion print

Gelatin silver POP prints had some popularity in the amateur market in the late 19th century and early 20th century, but they are very prone to fading (see Image 2.9). It was the gelatin silver DOP print that was the dominant process of the 20th century (see Image 2.10). Gelatin silver DOPs can have true black image tones and may have a reflective deposit of silver in the maximum density areas known as “silver mirroring.”

In 1968 resin coated (RC) paper was introduced, which added a layer of polyethylene on both sides of the paper to speed up processing times. Early RC prints can be prone to extreme cracking. The backs of these prints will feel like plastic rather than paper.

Image 2.9: A gelatin POP print

Image 2.10: A gelatin DOP print

Chromogenic Processes

This category of photographs represents the most common 20th-century color prints (see image 2.11), negatives, and slides (see image 2.12). It was commercially introduced in 1942 and continues on a smaller scale to the present (2024).

The process of creating chromogenic images relies on the light sensitivity of silver salts, but the resulting image is formed entirely of dyes. Dyes are inherently unstable and can fade even in the dark. The only way to slow this process is to lower the storage temperature. These processes are a high priority for digitizing as a form of preservation. These are also items to prioritize for low-temperature storage if that is an option (see specific recommendations in the section on storage environment at the end of the chapter).

Image 2.11: A chromogenic print

Image 2.12: A chromogenic slide

Negatives

Negatives are the photosensitive object that was in the camera during exposure. It is the original object that is used to make multiple prints and often contains the most detail, making it important to preserve.

Paper negatives (in common use from 1840 to 1850) are silver image material on paper (see Image 2.13). They were often waxed to make them more transparent. They are extremely fragile, can be light sensitive, and are very rare.

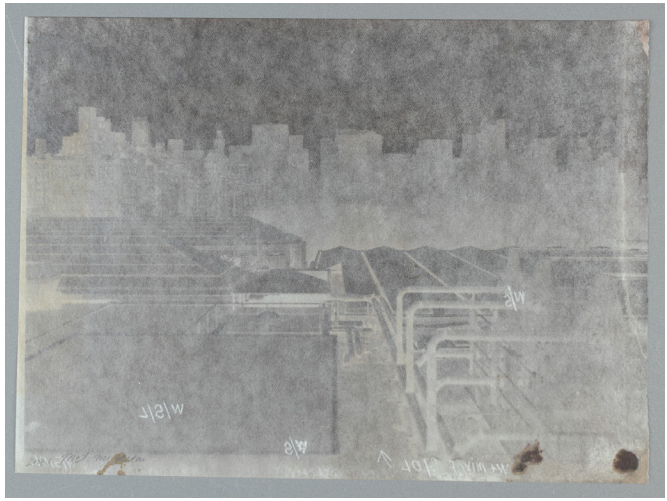

Image 2.13: A paper negative

Glass negatives had silver as their image material and could have a collodion (1851 to 1885) or gelatin (1878 to 1940) emulsion. The image in collodion negatives tends to be a pale brown color and may appear positive if a black backing is placed behind it (see Image 2.14). The image in gelatin negatives tends to be neutral black and may have silver mirroring (see Image 2.15). Gelatin negatives also tend to be on thinner glass supports than collodion negatives and will have smooth, even edges, whereas collodion negatives are more likely to be hand-cut with some irregularities at the edges.

Image 2.14: A collodion glass negative

Image 2.15: A gelatin glass negative. Note the blue cast of silver mirroring on the bottom and right edges.

In addition to chipping and breaking, glass is also susceptible to chemical deterioration, as described in the section on cased images. Paper enclosures are preferred because they allow greater airflow around the object. A low-humidity environment is important for the long-term preservation of these objects.

Negatives on plastic supports all have gelatin as the binder; if black and white, they have silver image material, and, if color, a chromogenic dye image.

Cellulose nitrate (in common use from 1889 to 1950) as a base has been documented to be highly flammable and is regulated by federal code NFPA 40 in the United States. Some nitrate film may say "Nitrate" at the edges or have a notch code to help identify it (see Image 2.16). It is best to have a trained photograph conservator evaluate your collection if you believe you have any photographs with a nitrate base.

Image 2.16: Detail of edge printing and notch code on a nitrate negative

Cellulose acetate (in common use from 1925 to the present) as a base is prone to "vinegar syndrome," which is so named because acetic acid is off-gassed from deteriorating film and smells like vinegar. This off-gassing causes the base for sheet film negatives (see Image 2.17) and roll film negatives (see Image 2.18) to deform and the film to discolor pink or blue as the antihalation layer reforms. It can also attack the silver image material and adjacent objects. Acid detection strips can be used to determine the extent of deterioration. These processes are a high priority for digitizing as a form of preservation. These are also items to prioritize for low-temperature storage if that is an option.

Image 2.17: An acetate sheet film negative

Image 2.18: An acetate roll film negative

Polyester (in common use from 1955 as sheet film and from the 1980s as roll film) is the most stable base, and deterioration is confined to factors associated with the emulsion. For example, gelatin silver films will tend to mirror and/or form redox blemishes if exposed to high humidity and pollutants, and chromogenic emulsions will show dye shifting/fading.

Handling Guidelines

The procedures applicable for handling most archival materials, such as having a clean, well-lit area with adequate space, apply to photographs as well. Many forms of damage resulting from improper handling are permanent. These include fingerprints, scratches, creases, dents, and damage from liquid or items dropping onto the photograph. Photographs do have unique vulnerabilities compared to other types of materials, and the following guidelines are important to follow:

Wear gloves whenever contact may occur with the front surface of a photograph or the metallic components of cased images. The metallic image material and the various binders are sensitive to acids and oils in the hands.

Fully support photographs with both hands and/or on a rigid base such as a piece of archival board during examination, especially for anything visibly fragile or over 11 x 14 inches (28 x 36 centimeters). Photographs are composite structures with multiple layers. Flexing/deformation of one layer causes damage in all layers. Additionally, many photographic prints were mounted on poor-quality, brittle boards that can break easily.

Do not drag anything across the surface of a photograph. Surface quality is extremely significant; photograph surfaces are delicate and easily disturbed.

Cover and mark "object below" any photographs left out on a work surface because they are generally sensitive to light.

Enclosures

The best photographic enclosures are ones that have passed the Photographic Activity Test. Most archival manufacturers will prominently display this. These materials should be widely available in North America and Europe. Sourcing materials of a known stable quality can be more complicated in many parts of the world, but there are some general rules to follow:

Plastic Enclosures

- These should be free of additives and surface coatings.
- Stable plastics in order of quality are polyester, polyethylene, and polypropylene.

Paper and Board Enclosures

- These should be lignin-free and composed of alpha cellulose or rag.
- The surface should be smooth and non-abrasive.
- They should not have dark colors or surface coatings.
- A pH pen can be used to perform a quick qualitative test on the enclosure material to determine whether it is acidic.
- Glassine or glassine-like papers should NOT be used with photographs!

In general, paper enclosures are less expensive, easier to write on, and lighter in weight. The one main advantage of plastic is its transparency, which allows the objects to be seen without being touched. Plastic is the best choice for objects that are handled frequently, but *plastic should NEVER be used with cellulose nitrate or cellulose acetate negatives* because it will trap the acidic off-gassing and accelerate deterioration. Plastic should also be used with caution in environments that are prone to very high humidity (over 65 percent) because swollen emulsions may be able to adhere to the sleeve. Multiple layers of enclosures (for example, an envelope in a folder in a box) will help to buffer the object against environmental changes in storage.

Storage Environment

The storage environment is the single most important factor in ensuring the long-term preservation of photographic materials. Mechanical systems (heating, ventilation, and air conditioning) provide the most reliable way to control the environment for collections, but they are the most complicated and costly for maintaining the

preservation standards of 70 degrees Fahrenheit (21 degrees Celsius) or lower and between 30 and 50 percent relative humidity (RH). In recent years, more research and attention have gone into making more sustainable choices with mechanical systems and using more passive approaches to achieve good preservation environments (Image Permanence Institute, 2012).

Most well-processed prints on paper are stable in standard storage environments. Many of the materials in photographs are highly sensitive to mold, oxidation, and planar distortions, which are encouraged by high relative humidity. The RH should remain below 60 percent and the temperature as cool as reasonably possible for the space. It is best to avoid dramatic fluctuations while allowing for some seasonal drift caused by the exterior climate.

The items that need the most attention are chromogenic processes and anything on a cellulose nitrate or cellulose acetate base. These should be prioritized for digitization and low-temperature storage if that is an option. Low temperature is defined here as anything below standard room temperature, usually identified as 68 degrees Fahrenheit (20 degrees Celsius). In specialized storage vaults, this may mean maintaining a temperature of 50 degrees Fahrenheit (10 degrees Celsius), 40 degrees Fahrenheit (4 degrees Celsius), or below freezing. The colder the temperature, the slower the deterioration, but it is important to consider the economic and environmental costs of maintaining these temperatures through mechanical means. Regardless of storage temperature, the most important factor is keeping the RH in the 30 to 50 percent range for these more sensitive materials.

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Notes

1 All of the figures and images presented in this chapter are of objects held in the study collection of the Weissman Preservation Center of the Harvard Library.