

EVERYTHING YOU EVER WANTED TO KNOW ABOUT YOUR FAMILY PHOTOGRAPHS

So your mother, father, aunt, uncle just unloaded a shoebox full of family photographs on you because of your interest in the family history. You have finished identifying the relatives as well as possible and now have no idea how to store the photographs for future generations. You realize that some of them are in great shape but some are fading, some are sticking to each other and some photographs have mold on them ...Yuck!

What is a genealogist to do now? It is a good idea as a first step to be able to identify the most common types of photographic processes. This will help confirm the period of time the photographs were made of that member of your family.

I have worked with several genealogists to help identify their photographs. On one occasion, a positive identification of a salt print allowed us to determine that this photograph was of the researcher's great-grandmother, whereas most of her family believed it was their grandmother. On another occasion, the identification allowed us to learn the proper orientation of an image. This allowed the researcher to conclude that this was in fact the house his grandfather was born in.

Photographic Identification

In the beginning...Ah! But where is the beginning? Did photography start in the year 1,000 AD when Alhazen described the principal of the "Camera Obscura" - a drawing aid meaning a dark chamber. 500 years later, Leonardo da Vinci described the same device and operated one outside his studio in Florence. Or should we consider the beginning in the 1560's when lenses were fitted to the Camera Obscura, allowing an image to be sharply focused on a piece of ground glass and allowed the operator to trace a picture on a thin sheet of drawing paper laid over the glass.

Daguerreotypes

Most authorities will agree that the first practical form of photography was encouraged through the experiments and developments (no pun intended) of Louis Jacques Mande Daguerre. Although William Henry Fox Talbot had been working on a process that recorded a negative image, Daguerre was the first to publicize his results and the discovery of the photographic process is attributed to Daguerre. The daguerreotype, popular from 1839-1860, was produced on a metal support of thin copper, with a highly polished mirror-like coating of silver. They are sealed in glass to protect the plate from atmospheric and physical damage. In America, daguerreotypes were most often placed in small hinged cases made of wood with a leather or paper covering. The daguerreotypes distinguishing features are its highly polished silver support and its quality of appearing as a negative, or a positive depending upon the angle of viewing and the direction from which light falls upon it.



a daguerreotype viewed as a positive

Due to limitations and difficulties of producing a large plate, daguerreotypes were rarely made any larger than 6 ½ to 8 ½ inches, known as whole-plate size. The most common size produced was sixth-plate size and measured 2 ½ by 3 ¼. It is estimated that by 1853 as many as three million daguerreotypes were made in the United States alone.

Salt Prints

As mentioned earlier, William Henry Fox Talbot patented a new process in 1841. This process became the first system to use a negative and a positive and allowed the photographer to produce positive prints in great quantities. Through additional refinements, one of the chemicals used to make the print more sensitive to light was sodium chloride (table salt)...Thus it acquired the name of salt print. It was soon noticed that these prints were subject to fading and that it was necessary to remove the fixer or the hypo from the paper. The normal identification features of a salted paper print are a smooth but dull surface, an obvious lack of very fine detail and a silver image located in the fibers of the paper support rather than confined to the surface. Depending upon the choice of papers and methods of altering the image tone, salt prints were made to have a wide variety of color hues, ranging from brick red to a rich purple-black. Since many of these prints were produced before the importance of fixing, washing and toning were realized, countless have suffered serious fading. Salted paper prints were popular from 1839-1860.

Albumen Prints

A further improvement over the Salt Print was introduced by Louis-Desire Blanquart Evrard in 1850. Initially, photographers prepared their own albumen paper by coating a thin sheet of paper with egg white...hence the name albumen print. The albumen served to hold the light sensitive silver salt on the surface of the paper. After drying it was used in the same manner as salted-paper, with the image being formed by the darkening properties of the sun on the chemicals (like a suntan for the prints). For both aesthetic and preservation reasons, the prints were toned with gold-chloride, which gave the image a rich purple-brown color. Albumen paper was widely used throughout the world and the majority (80%) of the surviving photographs of the 19th century are on albumen paper. That is why it is important for you to be aware of this material's susceptibility to factors which cause deterioration. It is fairly easy to learn how to identify albumen prints. With careful examination and under magnification it is possible to clearly see the paper fibers through the albumen. Many albumen prints show a very fine lateral cracking of the overall glossy surface. The paper support is very thin and coated with albumen. Early gelatin and collodion papers were made to imitate the look of albumen papers and may confuse the inexperienced examiner. Because albumen tends to yellow, an albumen print will almost always have yellowed highlights (light areas). Due to the thinness of the paper, most albumen prints were mounted onto stiffer papers and cardboards. A popular format was the Carte de Visite. Other formats are listed in addendum A. These support boards and the adhesives used to hold the print to them contribute very significantly to the conservation problems of albumen prints. Characteristically, albumen prints begin to lose density in the lower density (lighter) areas, thus losing highlight detail and reducing contrast. With time, as the silver continues to be attacked by sulfur and other elements, the image changes from the cooler purple-brown to a warmer reddish-brown. It is very important to understand that prints that are in relatively good condition due more to chance than through a careful program of preservation may not remain so if exposed to harmful conditions of high humidity and temperature or exposure to oxidants and sulphiding agents. Therefore, high standards of storage and display are required to prevent deterioration of the image quality.

Another advance in photographic history was the use of gold toning. In this process, the silver image was partially converted to gold by treatment in a solution containing gold chloride. This process was first applied to paper prints in 1847. It changed the image tone on a silver paper from reddish-brown to purple and significantly improved the stability of the silver image. Most prints that are in excellent condition today, are that way because they have been toned.

Ambrotypes

In 1851, Frederick Scott Archer announced his wet plate collodion process. Collodion is cellulose nitrate (or cotton) dissolved in ether and alcohol. In order to provide the most sensitive film (fastest), the plate had to be exposed while still wet, hence its name. This system provided a transparent negative and although through other methods this negative image could be made positive (as in the ambrotype), its most significant contribution was the use as a transparent negative. The use of the wet-plate negatives to produce positive images on albumen paper truly altered the course of photography, but the most popular use of this was the ambrotype. By backing the collodion negative with a dark material the image appeared as a positive. In some examples, dark purple, blue or red glass was used as a support, thus eliminating the need for a backing. Ambrotypes were presented in mounts and cases in the same fashion as daguerreotypes and because of this they are commonly mistaken for daguerreotypes. It is a simple matter to distinguish between the two since ambrotypes appear as positives at all angles of viewing as opposed to the daguerreotype which is truly visible as a positive only at certain lighting angles.

Tintypes

The idea of using a thin sheet of iron with a surface coated with a black varnish as a support instead of glass with a dark backing was patented by Hamilton Smith in 1856. This process would be more properly called ferrotype, since there is no tin in it at all. This expensive and easily handled form of photography was a particular favorite of traveling photographers from the time of its introduction in 1854 to as late as the 1930's. They were made in the millions and are very commonly found today. America was the favorite place of production. Early tintypes were cased like daguerreotypes and ambrotypes. It is very difficult to tell an ambrotype from a tintype when it is under glass in a case. Uncased tintypes are readily identified by the thin metallic plate holding the positive image. Occasionally tintypes are found on plates that are brown or red instead of black. Most tintypes were varnished to protect the surface from abrasion and atmospheric attack. They were made in a variety of sizes from the most common format being 2½ x 3½ inches, the same size as the carte de visite paper prints.

The next 40 years in photographic history became experimental with many new processes and techniques being used. Because there were far less of these photographs produced, it is not as necessary to elaborate on these processes as with the more major contributions.

Crayon Portraits

Crayon portraits were made from the 1860's through the turn of the 20th century. A weak photographic image was used as the basis for the extensive handwork with charcoal or pastels. They were usually life sized and were neutral black images on a matte-surfaced paper as the underlying photographic 'sketch.'

Carbon Prints

In 1839 Mungo Ponton discovered a new process based on the light sensitivity of bichromates. When added to gelatin, bichromates render the coating insoluble upon exposure to light. In other words, wherever light touched the coating, that part of the emulsion would not dissolve away. Carbon black was one of the first pigments used, hence the name - carbon prints. Sometimes pigments were chosen for their ability to mimic albumen print image colors. The beauty and durability of carbon prints was undisputed, but they were too time-consuming and difficult to challenge the silver papers.

Platinum Prints (Platinotypes)

A platinum print, or platinotype, consists of finely divided platinum metal and are exceptionally stable. The process came into use around 1880 and was popular until about 1930. These prints have a matte surface; most have a steely-gray image color, although some variations of the process produced browner image hues.

Cyanotypes

The cyanotype, or 'blueprint' process, was another of astronomer Sir John Herschel's contributions to photography. Although the process dates back to the 1840's, it was used rather infrequently until the 1880's. Like the platinotype, the cyanotype has a matte surface and its process is based on the light sensitivity of iron salts. The image stability of cyanotypes is good, though not as stable as the platinotype. Cyanotypes fade when exposed to light, but the lost image density is regained in large measure during storage in the dark. Gelatin and collodion printing-out papers became popular in the mid 1800's, replacing albumen paper as the dominant photographic printing material. These papers were the forerunners of our modern photographic papers. They no longer had to be coated by the photographer and were coated on long continuous rolls with much greater sensitivity to light. These papers offered a wide range of surfaces, image colors and contrasts and their image stability was superior. Sales of slow developing-out papers increased dramatically in the last three or four years of the 19th century, led by an ever-increasing number of amateurs.

Conservation & Preservation of 19th Century Photographs

Since the early 19th century, photographs have provided a historical record and a source of information about their times. For this reason, art galleries, museums, archives, libraries and historical societies as well as government, business and private individuals all have an interest in the preservation and restoration of photographs. Through the years there has been very little factual information published on this subject. As a result, while there are some conservators who know a great deal about photographic conservation, there are many custodians of collections who have little knowledge or experience with photographic materials and how they effect the lifetime of the photographic image. In addition, they have no knowledge of the techniques and procedures that can be used to protect or restore old photographs. Photographic conservation is a relatively new field that started gaining popularity only within the past decade. The field of photographic conservation is still in its infancy as a separate area of study. In 1982 there were perhaps as few as only 24 professional photographic conservators in the world.

Black and white photographs, when properly processed and stored, are both stable and permanent. Generally, these two requirements have not been applied to many historic photographs, causing deterioration. There are four major forms of photographic deterioration which can be categorized as follows: Environmental, Chemical, Physical and Biological deterioration.

Environmental Deterioration

The most common form of deterioration also happens to be the easiest to control. By far, the single most serious cause of deterioration is excessive humidity and is quickly followed by extremes in temperature, which are both forms of Environmental deterioration. The "ideal" humidity for photographs should be 50% relative humidity $\pm 5\%$ and the temperature should be 68°F $\pm 2^\circ$ F. These are quite rigid specifications, especially in the northern parts of the United States and may be beyond the means of most owners of photographs. The most practical system for environmental control would be an air conditioned room in the summer and the use of electric heat in that room in the winter. There is one additional controlled environment that a genealogist once asked me about and which I thought was such a wonderful idea, that this is where I now store all of my family photographs. Most banks have 'safe' deposit storage boxes that are not only very secure, but are kept in an environment which is close to ideal. Perhaps the most devastating conditions for photograph storage would be cyclic heat and humidity such as you would find in an attic.

Controlled humidity and temperature would help prevent curled prints, mold growth, fungus, foxing (blotchy, reddish-brown stains on prints or mounts), negatives sticking to containers or themselves and photographs sticking to glass frames. Obviously, the worst places to store photographic materials would be in an attic or basement, yet this is where 60-70% of all personal photographs are kept. Are you guilty???

In addition to humidity and temperature under the environmental list, air contamination would be the third most significant type of environmental deterioration. One of the serious problems in preservation is the relatively large quantity of oxidizing gases in the atmosphere in certain areas. Large cities must contend with coal-burning industries, gasoline and diesel engines and oil and gas-burning systems. High pollution also exists in areas where paints, printing inks, lacquers, enamels, varnishes and cosmetics are being used. Near the seacoast, very small amounts of airborne salts may infiltrate into storage areas which not only accelerates chemical degradation, but also encourages the growth of microorganisms.

Chemical Degradation

The second most common form of deterioration is chemical degradation. The two kinds of chemical degradation that are most frequently observed are image fading (discoloration) and stains. The black image which is most commonly a silver product, will turn a yellowish-brown with inadequate processing techniques. This occurs most often when fixer is left in the print or film because of insufficient washing. The job of the fixer in the photographic process is to reduce the unexposed silver to a salt product that can be washed away. When the fixer is not removed, it acts like a bleach to the silver and, in effect, reduces or removes the silver. It acts on the highlight (lightest) areas first and thus reduces the contrast in the print. When fixer is not removed from the print, it causes the silver to appear as if it is 'fading.' This can be improved by the restoration process which will be explained in a later section. The second type of chemical degradation is created by insufficient fixing. During the later half of the 19th century, photographers were not aware of the consequences of inadequate processing. Additionally, they did not have the monitoring devices we have today to let us know when the chemicals were no longer useful. Consequently, at times photographers were using fixers that were exhausted (used up) and this created dark stains on the prints. When the unexposed silver is not removed from the print by fixing it, the silver gradually darkens the more it is exposed to light.

Physical Deterioration

The third most common form of photographic deterioration is physical deterioration. This form is most prevalent in photographs that have been poorly stored. Some examples of physical deterioration are holes, scratches and spots that are caused from the abrasion of one material against another. Brittle matte board or photographs can snap and create losses in the image area. Glass plates, when not handled properly, can chip or break. Water can be a terrorist against a friendly photograph. I have seen collections totally destroyed from flooded basements, burst water pipes, spillages and have seen many photographs that have stuck to the glass from a frame due to excessive moisture.

Biological Deterioration

Biological deterioration is the fourth form of photographic deterioration. Photographic materials contain ingredients - such as gelatin and cellulose in paper - that are real treats to insects and rodents. The best preventative is to follow good housekeeping practices. Any windows that might be left open should have screening to protect against insects; they are attracted to fungus and may damage the emulsion layer. Insects will actually chew away pieces of prints and even containers, especially when they are moist. Another method of protecting processed photographic materials from biological attack is to seal them in envelopes such as the Kodak storage envelopes for processed film.

Preservation

One of the most important factors affecting the preservation of photographs is the storage and display conditions to which they are subjected. This includes the material in which they are enclosed, the area in which they are stored and the manner in which they are displayed.

Processed negatives, slides and prints should be enclosed in special envelopes, sleeve file folders, or albums to protect them from dirt and physical damage and to facilitate identification and handling. Certain paper and plastic enclosures are satisfactory, provided the temperature and relative humidity are within the previously discussed safe tolerances. However, these materials are porous and do not protect against environmental effects. The paper used should be chemically stable and have a slightly rough or matte surface to prevent sticking.

Photographic preservation has become a highly technical field of study. Although it is not necessary to know or understand the specifications of the proper paper to use, it will provide a better understanding of the necessity to use proper materials to protect your photographs. Paper that will be in direct contact with a photograph should have an alpha cellulose content in excess of 87%, be free of groundwood, contain neutral or alkaline sizing chemicals, have a pH between 7.0 and 9.5 for black and white materials with a 2% alkaline reserve, and be void of waxes, plasticizers, or other ingredients that may transfer to photographic materials during storage.

The following are a list of storage materials that are safe to use for archival storage. However, it is important to note that at times manufacturers may change their formulation without notification and this may change the product's archival properties.

PAPER ENVELOPES are made from the highest quality paper and are proven to be the most satisfactory system for enclosing photographic materials. These should be acid-free, high alpha-cellulose papers that are buffered against changes in pH. Two very critical aspects of paper envelopes are the position of the glued seam and the adhesive used to seal it. Avoid envelopes with the seam down the center and avoid seals using animal or vegetable glues. KODAK STORAGE ENVELOPES are heat-sealable, made of aluminum foil that has been coated with polyethylene on the inside and laminated to a paper on the outside. CELLULOSE ACETATE SLEEVES are transparent enclosures that provide a way to view and handle photographs without removing them from the enclosures. FOLDERS are single fold seamless holders, very much like manila file folders, but they are made from archival materials. They are also available in triacetate, polyester or polypropylene. INTERLEAVES can be made from either paper or plastic sheets that are used to separate individual photographs from coming into direct contact with each other. ALBUMS are not usually suitable for long term storage unless they are fabricated with materials that make them safe for this purpose. Albums tend to be the most popular storage medium. Archival storage albums, although more expensive than conventional albums, are available at most archival suppliers and dealers.

Plastics are one of the safest materials to use in direct contact with photographs. However, some plastics contain additives to strengthen plastics or make them more pliable, etc. Only the following plastics have been considered safe to use in association with photographs: Polyester, Mylar, Polypropylene, Polyethylene, Tyvek and Cellulose Triacetate.

A number of materials often used in the storage of negatives and prints are detrimental to the photographic image and its support. Among the materials known to be detrimental to photographs are wood and wood products such as plywood, hardboard, chipboard, low-grade paper, glassines and strawboard. There are also some concerns with the use of chlorinated, nitrated formaldehyde-based plastics, lacquers, enamels and materials that contain plasticizers. Other items that may be detrimental to processed photographic materials while they are in storage including rubber, rubber cement, Polyvinyl Chloride (PVC) and hygroscopic adhesives or those containing iron, copper, sulfur or other impurities. Pressure sensitive tapes and mounting materials, as well as acid inks and porous tip marking pens that use water-base dyes should also be avoided. Adhesives that should be avoided are starch paste, animal glue, rubber cement, shellac and contact cement.

When photographs deteriorate or are damaged, there is frequently a strong desire on the part of the owners to restore them to their original appearance and condition. There are many physical and chemical treatments which can be utilized to improve the aesthetic, informational and physical strength of an aged photograph. However, there are many factors which may limit their effectiveness. In fact, owners should be aware that almost any treatment of an original photograph carries with it a potential to do as much harm as good. Photographs of great cultural, historic, aesthetic, collectible or even just sentimental value should never be treated by amateurs. Only within this past decade has the science of professional photographic conservation come into its own right. Photographic conservators are developing many ways of reviving and reclaiming deteriorated photographic images.

The five forms of photographic restorations include: Electronic restoration, Chemical restoration, Physical restoration, Airbrush restoration and Copying.

Because of today's technology, the newest form of restoration is electronic restoration, more properly called Electronic Imaging Enhancement (or EIE). In this system, the picture to be restored is scanned and the electronic signals are digitized and projected onto a computer monitoring screen. The operator decides what restoration processes are needed and inputs this into the computer. The operator is able to remove blemishes in the photograph such as scratches or stains, etc. Although the technology has been realized, the commercial use is not quite ready to make it a practical form. The key item in the system is a sensor onto which the picture is imaged. While it has adequate resolving power, it is not as good as that of a good photograph. Progress is being made, however, into producing better sensors with better resolution. A principal problem with EIE is the cost of the equipment. System costs are so high that to produce an image the user would find the costs to be prohibitive. Therefore it is not practical at this time to consider this form of restoration for the average person's use.

Chemical Restoration

Chemical restoration of black and white photographs is based on redevelopment or bleaching and redevelopment. A badly faded black and white photograph may have an image that is barely visible. Technically, what has happened is that the metallic silver in the image has been oxidized to form a colorless silver compound. If the faded photograph is redeveloped in a black and white developer, the silver salts in the faded areas will be reconverted to silver metal and the resulting image may be a considerable improvement over the faded original. A more effective chemical restoration procedure is to bleach the faded image and then redevelop. There are a couple of serious reservations about using the bleach and redevelopment procedure. First and foremost is the possibility of causing degradation of the old emulsion to the extent that the photograph is irreversibly damaged. Second, bleach and redevelopment irreversibly changes the original. You should never allow any work to be done on your photograph that cannot be undone. Only Photographic Conservators should be allowed to work on an original photograph.

Physical Restoration

The next restoration topic is the use of Physical restoration methods. Only one physical restoration method has been fully developed and this is based on Neutron Activation, which has provided very good results from faded images. This technique is non-destructive and so reversibility is not a problem. This procedure is a rather complicated interaction of several techniques: neutron irradiation, autoradiography and photography. Thus, though it is a restoration procedure that is highly recommended, it is not a readily available method and so has never seen widespread application. Another physical restoration technique is the use of X-Ray fluorescence. The idea here is to scan the photograph with a beam of X-Rays and make a photograph of the X-Ray fluorescence of the silver atoms or ions in the photograph. Again, while this is a non-destructive method, the equipment needed for this is elaborate and actually not yet fully developed.

Copying

By far, the least expensive restoration is the photographic copying and duplication technique. The duplication process makes it possible to generate corrections and changes to original transparent materials such as negatives and positives. Tone reproduction can actually be improved by reducing or increasing the contrast in the duplicate. Copying is particularly helpful in lightening stains or enhancing faded prints, daguerreotypes, ambrotypes, albumen and salt prints. Family photographs have unknown or undertermined stability. A copy negative and print from a reliable lab could have archival stability if that is specified. Finally, copying provides a way of producing reprints in quantities. Photographic copies could also be considered an insurance policy to provide the protection for loss or deterioration of your precious family photographs.

Airbrush Restoration

The last form of restoration is the Airbrush Restoration and costs for this vary according to the amount of work that is required. This technique requires the skill of an artist and a paintbrush that 'atomizes' the paint. There are several steps that are required for this process and a brief explanation will give you an understanding as to what is involved in this most common form of photographic restoration work. A copy print is made and used as a work print because work should never be done to the original. The first step is to reduce major dark areas with a photographic bleach. This cleans up the highlights and opens up, or lightens, the darkest areas where detail is still important. After the work print has been rewashed and dried, adding densities to small areas will be the next step. This is particularly useful to photographs that have fine cracks. Then the darker densities such as spots or other cracks can be lightened with wax-based opaques. Larger areas may require several applications to build up the proper density. Next step is to consider adding shading to sections such as facial features, as well as adding highlights to those areas. The artist may need to add highlights and shading to clothing, backgrounds, hair or any object that has lost some detail. Different techniques may be utilized to remove or even add a background, combine one photograph with another, open up a closed eye, repair teeth, remove an object or person from a photograph, etc. Almost anything can be accomplished with an airbrush restoration if the artist is well qualified. Keep in mind, however, that the more airbrush work that is done, the less the finished piece will look like a photograph.

Preserving our photographs is like preserving our history. Those that are able to trace their family history for several generations are very fortunate. To have the ability to see from whom we are descended gives us a unique vision of our heritage. How fortunate are those who have family photographs. For historic value or for sharing memories, let us make a commitment to pass our photographs on to future generations. The only way that this will be possible is to take care of what we have today.