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CANTERBURY DISASTER SALVAGE TEAM

NEWSLETTER

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This issue's main focus is to provide some background information as a primer for the 2008 Annual Workshop on Care and Handling of Photographs (see CDST News section on last page for more details).

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History of Photography

(Source: Wikipedia website, for the entire article go to http://en.wikipedia.org/wiki/Photography)

Photography is the process of recording pictures by means of capturing light on a light-sensitive medium, such as a film or electronic sensor. Light patterns reflected or emitted from objects expose a sensitive silver halide based chemical or electronic medium during a timed exposure, usually through a photographic lens in a device known as a camera that also stores the resulting information chemically or electronically.

The word "photography" comes from the French *photographie* which is based on the Greek words φως *phos* ("light"), and γραφίς *graphis* ("stylus", "paintbrush") or γραφή *graphê* ("representation by means of lines" or "drawing"), together meaning "drawing with light."

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Photographic cameras
The camera or camera obscura is the image-forming device, and photographic film or a silicon electronic image sensor is the sensing medium. The respective recording medium can be the film itself, or a digital electronic or magnetic memory.

Photographers control the camera and lens to "expose" the light recording material (such as film) to the required amount of light to form a "latent image" (on film) or "raw file" (in digital cameras) which, after appropriate processing, is converted to a usable image. Modern digital cameras replace film with an electronic image sensor based on light-sensitive electronics such as charge-coupled device (CCD) or complementary metal-oxide-semiconductor (CMOS) technology. The resulting digital image is stored electronically, but can be reproduced on paper or film.

Image capture is only part of the image forming process. Regardless of material, some process must be employed to render the latent image captured by the camera into the final photographic work. This process consists of two steps, development, and printing.

History

Nicéphore Niépce's earliest surviving photograph, c. 1826. This image required an eight-hour exposure, which resulted in sunlight being visible on both sides of the buildings.

Photography is the result of combining several technical discoveries. Long before the first photographs were made, Ibn al-Haytham (Alhazen) (965–1040) invented the camera obscura and pinhole camera, Albertus Magnus (1193–1280) discovered silver nitrate, and Georges Fabricius (1516–1571) discovered silver chloride. Daniel Barbaro described a diaphragm in 1568. Wilhelm Homberg described how light darkened some chemicals (photochemical effect) in 1694. The fiction book *Giphantie* (by the French Thiphaigne de La Roche, 1729-1774) described what can be interpreted as photography.

Photography as a usable process goes back to the 1820s with the development of chemical photography. The first permanent photograph was an image produced in 1826 by the French inventor Nicéphore Niépce. However, the picture took eight hours to expose, so he went about trying to find a new process. Working in conjunction with Louis Daguerre, they experimented with silver compounds based on a Johann Heinrich Schultz discovery in 1724 that a silver and chalk mixture darkens when exposed to light. Niépce died in 1833, but Daguerre continued the work, eventually culminating with the development of the daguerreotype in 1839.

Meanwhile, Hercules Florence had already created a very similar process in 1832, naming it *Photographie*, and William Fox Talbot had earlier discovered another means to fix a silver process image but had kept it secret. After reading about Daguerre's invention, Talbot refined his process so that it might be fast enough to take photographs of people. By 1840, Talbot had invented the calotype process, which creates negative images. John Herschel made many contributions to the new methods. He invented the cyanotype process, now familiar as the "blueprint". He was the first to use the terms "photography", "negative" and "positive". He discovered sodium thiosulphate solution to be a solvent of silver halides in 1819, and informed Talbot and Daguerre of his discovery in 1839 that it could be used to "fix" pictures and make them permanent. He made the first glass negative in late 1839.

In March of 1851, Frederick Scott Archer published his findings in "The Chemist" on the wet plate collodion process. This became the most widely used process between 1852 and the late 1880s when the dry plate was introduced. There are three subsets to the Collodion process; the Ambrotype (positive image on glass), the Ferrotype or Tintype (positive image on metal) and the negative which was printed on Albumen or Salt paper.

Many advances in photographic glass plates and printing were made in through the nineteenth century. In 1884, George Eastman developed the technology of film to replace photographic plates, leading to the technology used by film cameras today.

Types

Black-and-white photography
All photography was originally monochrome, or *black-and-white*. Even after color film was readily available, black-and-white photography continued to dominate for decades, due to its lower cost and its "classic" photographic look. It is important to note that some monochromatic pictures are not always pure blacks and whites but contain other hues depending on the process. The Cyanotype process produces an image of blue and white for example.

Color photography
Color photography was explored beginning in the mid 1800s. Early experiments in color could not fix the photograph and prevent the color from fading. The first permanent color photo was taken in 1861 by the physicist James Clerk Maxwell.

One of the early methods of taking color photos was to use three cameras. Each camera would have a color filter in front of the lens. This technique provides the photographer with the three basic channels required to recreate a color image in a darkroom or processing plant. Russian photographer Sergei Mikhailovich Prokudin-Gorskii developed another technique, with three color plates taken in quick succession.

Practical application of the technique was held back by the very limited color response of early film; however, in the early 1900s, following the work of photo-chemists such as H. W. Vogel, emulsions with adequate sensitivity to green and red light at last became available.

The first color plate, Autochrome, invented by the French Lumière brothers, reached the market in 1907. It was based on a 'screen-plate' filter made of dyed dots of potato starch, and was the only color film on the market until German Agfa introduced the similar Agfacolor in 1932. In 1935, American Kodak introduced the first modern ('integrated tri-pack') color film, Kodachrome, based on three colored emulsions. This was followed in 1936 by Agfa's Agfacolor Neue. Unlike the Kodachrome tri-pack process the color couplers in Agfacolor Neue were integral with the emulsion layers, which greatly simplified the film processing. Most modern color films, except Kodachrome, are based on the Agfacolor Neue technology. Instant color film was introduced by Polaroid in 1963.

Color photography may form images as a positive transparency, intended for use in a slide projector or as color negatives, intended for use in creating positive color enlargements on specially coated paper. The latter is now the most common form of film (non-digital) color photography owing to the introduction of automated photoprinting equipment.

Historic Photographic Processes

(Source: Wikipedia website, for the entire article go to http://en.wikipedia.org/wiki/Photography and look up the link for each process under the main list. Material from the American Museum of Photography website, see Useful Websites at end of this article, has also been included.)

This is a selected list of those most commonly found in heritage collections. There are many, many more different types, see websites listed above and at the end of this article for further information.

Albumen print
The albumen print, also called albumen silver print, was invented in 1850 by Louis Désiré Blanquart-Evrard, and was the first commercially exploitable method of producing a photographic print on a paper base from a negative. It used the albumen found in egg whites to bind the photographic chemicals to the paper and became the dominant form of photographic positives from 1855 to the turn of the century, with a peak in the 1860-90 period. During the mid-1800s, the carte de visite became one of the more popular uses of the albumen method. In the 19th century, E. & H. T. Anthony & Company were the largest makers and distributors of the Albumen photographic prints and paper in the United States.

Ambrotype
The ambrotype process (from Greek *ambrotos*, "immortal") or amphitype is a photographic process that creates a positive photographic image on a sheet of glass using the wet plate collodion process. It was patented in 1854 by James Ambrose Cutting of Boston, in the United States. The wet plate collodion process was invented just a few years before that by Frederick Scott Archer, but Cutting used it as a positive, instead of a negative.

In Great Britain it was called *collodion positive*: one side of a very clean glass plate is covered with a thin layer of collodion, then dipped in a silver nitrate solution. The plate is exposed to the subject while still wet. (Exposure times vary from five to sixty seconds or more depending on the amount of available light.) The plate is then developed and fixed. The resulting negative, when viewed by reflected light against a black background, appears to be a positive image: the clear areas look black, and the exposed, opaque areas appear light. This effect is achieved by coating one side of the glass negative with black varnish. Either the emulsion side or the blank side can be covered with the varnish: when the blank side is blackened, the thickness of the glass adds a sense of depth to the image. In either case, another plate of glass is put over the fragile emulsion side to protect it, and the whole is mounted in a metal frame and kept in a protective case. In some instances the protective glass was cemented directly to the emulsion, generally with a balsam resin. This protected the image well but tended to make it darker.

The ambrotype was much less expensive to produce than the daguerreotype, and it lacked the daguerreotype's shiny metallic surface, which some found unappealing. By the late 1850s, the ambrotype was overtaking the daguerreotype in popularity; by the mid-1860s, the ambrotype itself was supplanted by the tintype and other processes.

Ambrotypes were often hand-tinted. Untinted ambrotypes are grayish-white and have less contrast and brilliance than daguerreotypes.

Autochrome
Autochrome plates were the invention of Auguste and Louis Lumiere, who patented the process in 1904 and began to market it commercially in 1907. Microscopic grains of potato starch were dyed red, green, and blue-violet, then mixed evenly and coated onto a sheet of glass. A black-and-white emulsion was then flowed over this layer. During exposure, the grains of potato starch on each plate acted as millions of tiny filters. The light-sensitive emulsion was then reversal processed into a positive transparency. When viewed, light passes through the emulsion and is filtered to the proper color by the starch grains. The resulting mosaic of glowing dots on glass gives autochromes the look of pointillist paintings.

Bromoil Process
The Bromoil Process was an early photographic process that was very popular with the Pictorialists during the first half of the twentieth century. The soft, paint-like qualities of the prints are very typical for this genre, and have recently led to some art photographers using the process again.

The bromoil process was based on the oil print, whose origins go back to the mid-nineteenth century. A drawback of oil prints was that the gelatin used was too slow to permit an enlarger to be used, so that negatives had to be the same dimensions as the positives. After G.E.H. Rawlins published a 1904 article on the oil print process, E.J. Wall in 1907 described theoretically how it should be possible to use a smaller negative in an enlarger to produce a silver bromide positive, which should then be bleached and hardened, to be inked afterwards as in the oil process. C Welborne Piper then executed this theory in practice, and so the bromoil process was born.

Calotype
Calotype was the name given to the first practical negative-positive process of photography. Capable of producing multiple copies of any given image, the calotype (also called Talbotype) was invented by William Henry Fox Talbot in September of 1840. An earlier Talbot invention, photogenic drawing, was also capable of creating photographic images in the camera, but was quite slow and could not be used for photographing people or anything that moved. To make a calotype, plain sheets of writing paper are coated with a solution of silver nitrate, dried, then dipped in potassium iodide to form silver iodide. After being dried again, the paper is floated on a mixture containing silver nitrate and gallic acid. The same mixture is used to develop the negative image after exposure. Following fixing in hypo, this paper negative was generally waxed for transparency and used to make salt prints.

Carbon Prints
Carbon prints, patented in 1864 by Joseph Wilson Swan, offered a permanent image without grain. The process was capable of making exquisite prints with a wide tonal range. Negatives were printed onto a "tissue" containing carbon and other pigments in a gelatin base. The gelatin had previously been made light-sensitive by a bath of potassium bichromate. After washing, the image on the tissue was transferred to a paper base and the backing of the tissue was stripped off.

Collodion Prints
Collodion prints used the same sticky nitrocelluluse emulsion, collodion, as ambrotypes. This was mixed with silver chloride and coated onto paper. The surface could be matte, glossy, or semi-gloss like an albumen print. The whites of the image generally lack the yellowish cast of albumen prints. Collodion prints are difficult to distinguish from other silver prints made circa 1890-1910, and usually require testing by a trained conservator to identify with certainty.

Cyanotype
The cyanotype process was invented in 1842 by Sir John Herschel but was most popular around the turn of the century. The brilliant blue images have a matte surface. Because iron salts are used (rather than silver compounds) for the light-sensitive material, cyanotypes are highly stable. Architectural blueprints were made by the same process.

Daguerreotype
The daguerreotype is an early type of photograph, developed by Louis Daguerre, in which the image is exposed directly onto a mirror-polished surface of silver bearing a coating of silver halide particles deposited by iodine vapor. In later developments bromine and chlorine vapors were also used, resulting in shorter exposure times. The daguerreotype is a negative image, but the mirrored surface of the metal plate reflects the image and makes it appear positive in the proper light. Thus, daguerreotype is a direct photographic process without the capacity for duplication.

While the daguerreotype was not the first photographic process to be invented, earlier processes required hours for successful exposure, which made daguerreotype the first commercially viable photographic process and the first to permanently record and fix an image with exposure time compatible with portrait photography.
The daguerreotype is named after one of its inventors, French artist and chemist Louis J.M. Daguerre, who announced its perfection in 1839 after years of research and collaboration with Joseph Nicéphore Niépce, applying and extending a discovery by Johann Heinrich Schultz (1724): a silver and chalk mixture darkens when exposed to light. The French Academy of Sciences announced the daguerreotype process on January 9 of that year.

The daguerreotype is a unique photographic image allowing no reproduction of the picture. Preparation of the plate prior to image exposure resulted in the formation of a layer of photo-sensitive silver halide, and exposure to a scene or image through a focusing lens formed a latent image. The latent image was made visible, or "developed", by placing the exposed plate over a slightly heated (about 75°C) cup of mercury.

The mercury vapour condensed on those places where the exposure light was most intense, in proportion with the areas of highest density in the image. This produced a picture in an amalgam, the mercury vapour attaching itself to the altered silver iodide. Removal of the mercury image by heat validates this chemistry. The developing box was constructed to allow inspection of the image through a yellow glass window while it was being developed.

The next operation was to "fix" the photographic image permanently on the plate by dipping in a solution of hyposulphite of soda – known as "fixer" or "hypo". The image produced by this method is so delicate it will not bear the slightest handling. Practically all daguerreotypes are protected from accidental damage by a glass-fronted case. It was discovered by experiment that treating the plate with heated gold chloride both tones and strengthens the image, although it remains quite delicate and requires a well-sealed case to protect against touch as well as oxidation of the fine silver deposits forming the blacks in the image. The best-preserved daguerreotypes dating from the nineteenth century are sealed in robust glass cases evacuated of air and filled with a chemically inert gas, typically nitrogen.

The intricate, complex, labor-intensive daguerreotype process itself helped contribute to the rapid move to the ambrotype and tintype. The resulting reduction in economy of scale made daguerreotypes expensive and unaffordable for the average person. According to Mace (1999), the rigidity of these images stems more from the seriousness of the activity than a long exposure time, which he says was actually only a few seconds (*Early Photographs*, p. 21). The daguerreotype's lack of a negative image from which multiple positive "prints" could be made was a limitation also shared by the tintype and ambrotype and was not a factor in the daguerreotype's demise until the introduction of the calotype. Unlike film and paper photography however, a properly sealed daguerreotype can potentially last indefinitely.

Tintype
The tintype (melainotype or ferrotype), is a photographic process invented in the United States in 1856 by Prof. Hamilton Smith of Kenyon College in Ohio. He patented the tintype on February 19, 1856 and it was first called a melainotype, then ferrotype (by a rival manufacturer of the iron plates used), but that nowadays are generally termed tintypes.

The photographs are made by a wet plate process, similar to the ambrotype. While the ambrotype remained very popular in the rest of the world, the tintype process superseded the ambrotype in the United States by the end of the Civil War and went on to become the most common photographic process until the introduction of modern gelatin based processes, and the invention of the reloadable amateur camera by the Kodak company. Ferrotypes waned in popularity by the end of the 19th century, although a few makers were still around as late as the 1950s and on some carnivals in Europe these images are still made as novelty.

The tintype was a minor improvement to the ambrotype, replacing the glass plate of the original process with a thin piece of black enameled, or japanned, iron (thus "ferro"). The new materials reduced the cost of the productions considerably, and the image, on gelatin-silver emulsion on the varnished surface, has proven to be very durable. Like the ambrotype, the image is technically negative, but, due to the black background, appears as a positive. Since the tintype 'film' was the same as the final print, most tintype images appear reversed (left-to-right) from reality. Some cameras were fitted with mirrors or a 45-degree prism to reverse and correct the image, while some photographers would photograph the reversed ferrotype to produce a properly oriented image.

The earlier melainotypes were often cased, like daguerreotypes and ambrotypes, but uncased images in paper sleeves and for albums were popular from the beginning.

Salt Prints
Salt prints were the earliest positive prints and were invented by William Henry Fox Talbot in 1840, as a direct development from his earlier photogenic drawing process. A salt print was made by soaking a sheet of paper in salt solution and then coating one side with silver nitrate. This produced light sensitive silver chloride in the paper. After drying, the paper was put directly beneath a negative, under a sheet of glass, and exposed to sunlight for up to two hours. Salt prints were made until about 1860 having been gradually replaced by the albumen print which gave a clearer image although the process was sometimes revised later.

Woodburytype
A photomechanical process in which the completed prints are not made with light-sensitive materials. One of the most beautiful and permanent of all methods of producing prints in quantity, the Woodburytype process was also among the most difficult. A light-sensitive gelatin material is exposed to a negative, resulting in a three-dimensional relief-map of the image. Then the difficult part: applying huge pressure (with a hydraulic press) on the gelatin relief to make an impression in a block of lead. The lead mold is used to make the prints, which have exquisite tonality and a slightly raised surface. Introduced 1865.

Useful and Interesting Sites

General History and Processes

American Museum of Photography
http://www.photographymuseum.com/
An excellent site with heaps of information and has links to several useful sites on photographic techniques and history.

MSN Encarta – History of Photography
http://encarta.msn.com/encyclopedia_761575598_1____52/photography_history_of.html#s52
An informative summary of the main points of the history of the technical development and use of photography.

Wikipedia – list of photographic processes
http://en.wikipedia.org/wiki/Photographic_processes
Many, many links to further information. As with all Wikipedia entries, they are generally reliable, but do recommend that you confirm any information before relying on it.

Victoria and Albert Museum – Photographic processes
http://www.vam.ac.uk/vastatic/microsites/photography/processes.php

Preservation and Conservation

The Getty Foundation
http://www.getty.edu/conservation/science/photocon/
Updates on recent research projects.

Minnesota Historical Society
http://www.mnhs.org/preserve/conservation/photographs.html
Selection of information pamphlets on caring for different types of photographs.

Library of Congress – Preservation documents
http://www.loc.gov/preserv/pubscare.html
Selection of publications on caring for different types of photographs, including bibliographies for further reference.

ICOM photographic materials working group
http://icom-cc.icom.museum/WG/PhotographicRecords/

ICON (institute for conservation)
http://www.conservationregister.com/carephotographs.asp?id=4
Summary on care and preservation of photographs.

Website Review

Jo Drysdall

Connecting to Collections: A Call to Action

http://www.imls.gov/collections/

This website is part of a multi-year, multi-faceted national initiative by the American Institute of Museum and Library Services. Launched at the June 2007 National Conservation Summit at The Donald W. Reynolds Center for American Art and Portraiture of the Smithsonian Institution, it aims, through the website, a touring roadshow and 2000 grants of collections' conservation texts, to raise public awareness of conservation issues facing heritage and living collections and inspire action.

The initiative is grounded in the results of the 2005 report *A Public Trust at Risk: The Heritage Health Index Report on the State of America's Collections,* which revealed that in the US alone:

- 190 million objects need conservation treatment,
- 65 percent of collecting institutions have damaged collections due to improper storage,
- 80 percent of collecting institutions lack an emergency plan for their collections and trained staff to carry it out, and
- 40 percent of institutions have no funds allocated in their annual budget for preservation and conservation.

Reading through the site, much of it does seem to be exactly what it aims to be – an inspirational piece. There are transcripts of the Summit speeches from Anne-Imelda M. Radice, Director, Institute of Museum and Library Services; Allen Weinstein, Archivist of the United States; and Francie Alexander, Senior Vice President & Chief Academic Officer, Scholastic Inc. All three speakers stress the need for more aggressive action in raising awareness of (and funding to alleviate) the plight of many collections.

However, the initiative as a whole contains more practical substance: as part of the 2000 American collections-based institutions have been given free copies of the *Connecting to Collections Bookshelf*, a core set of books, DVDs, online resources, and an annotated bibliography selected by IMLS as essential texts for the care of collections. The *Bookshelf* focuses on collections typically found in art or history museums and in libraries' special collections, with an added selection of texts for zoos, aquaria, public gardens, and nature centres. A summary of the contents of this resource can be found on the site – a useful reference as each work is reviewed and summarised in term of the major questions it answers.

The site itself is of course US-focused in its sections on funding and planning grants. However, the resources section is a useful page for international readers, bringing together a comprehensive set of links to PDF material from the US, the UK and a scattering of other countries on collections care and preservation. It is this section more than anything that will be of interest to local readers, as most of the information it contains is clear, concise and authoritative – and applicable anywhere.

CDST News

Website

Website prototype has been completed. There is still a bit of development work to do, but the website is at a stage now where it will soon be released publicly. A notice will be sent out when this has been done.

In relation to the website development, the CDST submitted a grant application to the Lotteries Environment and Heritage fund in June 2007. This application was for the development of four booklets focussing on Emergency Response for various collections and emergency situations. Our application was successful and now Lynn Campbell and Cynthia Cripps are busy doing the research and creating drafts for the booklets. When completed, the CDST will apply for a further grant to assist with publication, and also post the unpublished manuscripts on the new website.

2008 Workshop

The Care and Conservation of Photographs

17th and 18th July 2008

Instructor: Mark Strange, Photography Conservator, National Library of New Zealand

Venue: RNZAF Museum Wigram
Maximum participants 20

For further information or to register your interest contact Lynn Campbell
03 9417380 or lynn.campbell@ccc.govt.nz

Logo

And lastly, the CDST has a new logo, presented for the first time at the top of page one of this newsletter!