

## Timeline Survey to Explore the Types of Heritage Photography

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### Abstract

Photography was known for the first time in the 17th Century, 1830 A.D, and continued until ten years later when it was recognized. Before the invention of photography, people knew the basic principles of photography, as they processed the image on the wall or piece of paper, but it was not implemented. The printing process when preserving light turns out to be much more difficult than displaying it. A photographic image is created by exposing a light-sensitive emulsion - that is the essence of photography. The photographic emulsion, which is transferred to a paper or plastic support, consists of a light-sensitive image material (e.g., Most impressions are generally positive. Photographic prints can be either color or monochrome, meaning the image is rendered with a single color (e.g., B&W prints).

The timeline study, which highlighted many categories like architectural, cultural, and natural heritage photography, provided insightful information on the development of heritage photography. The results of the study showed how changes in technology have affected how these types have been documented and preserved over time, highlighting the significance of heritage photography in preserving and documenting our rich historical and cultural heritage.

### Keywords

Photographs, Timeline, Monochrome Prints, Color Prints, Instant Photos.

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## Introduction

John Herschel, who used photography expression for the first time in 1839 A.D., since then the photographic process has become general and widespread. It is derived from the Greek word writing with light. There have been many beginnings, first attempts in photography by a man called de la Roche (1729 - 1774), where he was able to acquire the image from nature on a holder covered with a sticky substance, but it does not settle on this holder as it disappears and he wished that the image would settle on the holder after drying, which was achieved a few years after his death. Photography is the product of two distinct processes, the first is the Optical Process, which is the Camera Obscura (which means in Latin for the darkroom), it was known about several centuries before the invention of photography, and it is believed that Camera Obscura was invented roughly during the 3<sup>rd</sup> Century The thirteenth and fourteenth, except that there is a manuscript from the Arab world, Al-Hasan Ibn Al-Haytham, a historian of the tenth century that describes the basic principles of the work of the darkroom, which corresponds to the principles of photography today, and it is possible that the most famous painters of the Renaissance used them, as Leonardo da Vinci noticed the possibilities of the darkroom in 1490 AD when it was recommended to observe the illuminated scenes that are painted on the wall of the darkroom using a hole in the wall as passing to the sun's rays [1].

The second process is the chemical treatment process. Hundreds of years before the invention of photography, people realized that some colors - especially those containing the element silver - were affected by the sun, so many attempts were made to obtain a photograph, and Thomas Wedgwood succeeded in this at the beginning of the century. In the nineteenth century, after many experiments in obtaining a silhouette image, it was not stable, as there was no known way to make it stable. The real idea of photography appeared in 1727 AD, when the German scientist "Johann Schulz" noticed the effect of silver salts with light, and in 1839 AD the term Photography was used and spread among people as John Herschel was the first to utter this term, syllable

"photo" means light, syllable for "*graphy*", it means drawing, so the term "photography" has come to mean drawing with light [2].

People knew how to display the images, but did not know how to install and preserve them. The first successful attempt to capture a photograph was made by the French "*Niépcé*" in 1827 AD. He photographed it after long studies and many unsuccessful attempts. He began his experiments in 1814 A.D. The image took about 8 hours of sunrise. The sun until sunset, which allowed the sun to move from east to west and illuminate the buildings on both sides, as the rotor used wood to preserve the film, *Niépcé* came up with the idea of using an oil derivative, which is (bitumen) Where the bitumen hardens upon exposure to lighting and the non-hardened material is removed by washing, the metal plate used by *Niépcé* was polished, making the resulting positive image covered with ink, producing a printed image, but one of the many problems in this method is that the metal plate used was heavy and expensive in addition to consuming a lot of time, *Joseph Niépce* used the idea of Johan Heinrich that he invented in 1724 AD which is exposing silver with chalk to the dark and then light Suddenly, the image became evident, and photography began to evolve little by little, an amazing development and the latest clear change in the world [3].

The birth of photography was by "Louis Daguerre". Only the design and implementation of the first wooden box camera was announced on January 7, 1839 AD, and the credit for the emergence of this camera was presented by many scholars, including the English scientist, "Henry Fox Talbot" in 1830 AD, Who was able to obtain a positive image from a glass negative by chemical solutions, and in 1839 Sir John Herschel came up with the first glass negativity in comparison with the metal, although the imaging process became easier and the result was better, but imaging is still not recognized by the public, after that Photography was used as a tool for the artist in carrying out his artwork [4].

For the first time, was publicly admitted to portraits were portraits of one person or family portraits to perpetuate memories. Then this

science developed as the artists tried to obtain a portable darkroom, this was the first seed of the photographic machine, the basic elements are (the lens, the iris, and the image's surface), and in 1660 AD, the Irish scientist Robert Boyle and his assistant developed the primitive camera and introduced it. In 1685 AD, the German scientist *Johan Tzan* invented the imaging system and built the large camera out of wood [5].

The art of photography has evolved rapidly from other arts, perhaps due to its widespread. The camera was evolved in the mid of the 19th century by many scientists, such as the French scientist Andrea Adolph who invented the *Carte de visite* method (which is that the film is in the form of cards small series), as well as the scientist "Clark Maxwell" whose research opened the door to the production of black & white film and then the color film. The first color image was in 1861 AD by Maxwell and Thomas Sutton [6].

In 1936 AD, the film Coda Corm appeared on the market, Agfa Chrome in 1938, Fuji Chrome in 1948 AD, and the first black and white camera from Polaroid Company appeared in 1947 AD, and the first instant camera with color papers in 1963 AD. Its rules are from the existing technological development in the world, and photography has gone beyond its traditional concept limited to developing and printing to digital photography, whose star shone and shine with the end of the twentieth century and the beginning of the third millennium [7].

## 1. Timeline of Prints

### 1. 1. Monochrome Prints

#### 1.1.1. Prints with one Layer (uncoated paper)

##### 1.1.1.1. Salt Print (1839 - 1860s)

Its common name is salted paper printing, dated 1839 - 1860 by William Henry Fox Talbot. It is the first positive print format, a matte, non-glossy surface, characterized by the clarity of paper fibers. It is created by direct contact of the negative with photosensitive paper that does not contain a binder, which makes the image secured between the fibers of the surface of the paper. In some cases, it contains a

watermark. The tone of the image is either monochromatic (reddish-brown (uncolored) or purplish-brown (toned). The image may appear yellowish-brown or yellow-green if it has faded damage. Salt-paper prints are weather-sensitive, subject to fading Exposure to light. Recommended to store cold <50 F, allowable fluctuation:  $\pm 5 F \pm 5\%$  RH, acid-free containers and/or binders (pH 7.2-9.5) are strongly advised.



**Fig. 1.** Salt paper print, by Tallbot. The J. Paul Getty Museum, Los Angeles.

#### 1.1.1.2. Cyanotype (c. 1872 - present; technical uses, c. 1872 - 1950s)

A cyanotype (Ferro-prussiate print) is a single-layer print. It began in 1872 in France and continues to be printed until now. It consists of a blue pigment image embedded in the fibers of uncoated paper. The color of the image is monochromatic, with a matte surface due to the lack of a bonding layer, the color is brilliant Prussian blue. It must be kept in a dark store due to its high sensitivity to light, and away from alkaline environment. Cold storage recommended to store cold <50 F, allowable fluctuation:  $\pm 5 F \pm 5\%$  RH, and use neutral, uncoated paper products to prevent blue fading. It is preferable to use stainless steel cabinets for storage.



Fig. 2. Cyanotype Photo, by Anna Atkins

#### 1.1.1.3. Platinum/Palladium Print (1873 - 1930s)

A platinum/palladium\* print is started in 1873 to late 1930s as a single-layer print comprised of a platinum or palladium image embedded in uncoated paper's fibers. It is a monochrome photographs Color varies between neutral grey-black, warm brown, brown-black, and lilac/blue-black. The surface is matte with no surface gloss due to the absence of a binder layer. Wherefore the paper fibers are visible. The support of image is uncoated paper. These images are considered one of the most stable types. The paper carrier is affected by the increased acidity, which exposes it to brittleness, and a sign of the image may appear inverted in the facing paper (this is irreversible). Therefore, it is recommended to store cold <50 F, allowable fluctuation:  $\pm 5 F \pm 5\%$  RH. Due to the acidity inherent in platinum print, it is recommended to store vertically with spacers between each print in an alkaline buffered container.

\* Gold, uranium, and iron additives fairly common



**Fig. 3.** Platinum/Palladium Print, by Peter Henry Emerson, 1886

*1.1.2. Prints with two Layers (uncoated paper w/ binder layer)*

1.1.2.1 Albumen Print (1850 - c. 1895)

Albumen prints were produced from 1850 to about 1895 by *Louis Blanquart-Evrard*, they replaced daguerreotypes and became commercially dominant. It is a two-layer print comprised of a paper support with an albumen binder and silver image. The surface is semi-glossy to glossy. The image is monochrome, tending to shades of brown. Albumen prints are distinguished by their thin leaves with a smooth surface. Paper fibers are clearly visible to the eye. In 1855 the prints became toned with gold chloride. They have been used for a photo that is a *carte de visite* (2½" x 4"), a cabinet card (6¼" x 4"), or a stereo-card (about 3½" x 7"). Some albumin prints suffer from foxing in the form of brown-red spots due to high humidity, albumin cracking due to exposure to low humidity, and are also sensitive to light and contamination.



**Fig. 4.** Albumen Print, by Shaheen.

#### 1.1.2.2. Carbon Print (1855 – 1950s)

Carbon prints were produced from 1855 to the 1950s. It is CarPro monochrome print consisting of a paper backing with a carbon black pigment image carried over by gelatin. Carbon black is one of the most stable pigments. It is subject to mechanical damage and staining, and it tends to curl up on itself. Slight fading or yellowing. Although it is one of the most stable prints of silver, it did not reach the spread among the people due to the time and great effort required to produce it.



**Fig. 5.** Carbon photo, by Hollister, George Buell, 1865-1952\*



### 1.1.3. Prints with three Layers (baryta-coated w/ binder layer)

#### 1.1.3.1. Glossy Collodion POP Print (c. 1867 - 1930s)

It called also Collodion POP print, Collodion printing-out paper, and Collodion-chloride. It is a three-layer monochrome print comprised of a paper support with a baryta layer, collodion binder, and a silver image. It was produced from around 1870 into the 1930s. It was the first emulsion type printing-out-paper (POP) to be marketed. Image tones range from reddish-brown to purple. Fading is minimal on these prints, they are sensitive to surface abrasion, so care must be taken in handling them to avoid abrasion and surface scratching. The emulsion layer may separate due to fluctuating relative humidity, therefore storage in a stable environment is recommended.



Fig. 1. Collodion Photo, by Hermann Krone 1857.

#### 1.1.3.2. Silver Gelatin DOP Print (c. 1874 – present)

It is also called gelatin silver printing, B&W [colloquial] printing, gelatin silver developed paper printing, gelatin silver bromide printing, DOP printing. They were in common use from about 1874 to the present, but their popularity has declined since the advent of digital photography. These prints are considered the most popular monochrome prints of the 20th century. Resin was introduced in 1968. It is a three-layer print consisting of a paper backing with Baretta or

resin paint, a gelatin roll, and a silver\* image. The surface varies in glossy, matte and texture. For paper fibers, it is not visible due to the presence of the baryta layer. Prints are done using photosensitive gelatin silver bromide or silver chloride gelatin paper. An off-color printed image is a neutral gray and black color unless severely degraded. Silver gelatin postcards also appeared around 1900-1940. Images of silver gelatin often show a silver reflection due to oxidation due to silver particles rising to the top of the gelatin layer. This phenomenon often appears along the edges and in the darker areas of the image. It is sensitive to deterioration as a result of contamination or improper storage, as a result of oxidation and reduction, dull and orange-yellow spots appear in the photo. It is also affected by moisture, as it may deform as a result of high humidity, and crack and become brittle as a result of low humidity. Sticking to resin surfaces may occur as a result of high temperatures.



**Figure 2.** Gelatin Silver Print, by Shaheen.

#### 1.1.3.3. Gelatin POP Print (1885 – 1910)

A gelatin POP print is also called Gelatin printing-out paper, Citrate paper, and Solio [Kodak]. The gelatin POP process was often used in

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\* Toning common.

commercial portraiture from 1885 – 1910. It was a three-layer print comprised of a paper support, baryta, gelatin, and a silver image. It has a matte, glossy surface, and burnishing surface. Maybe we can find baryta layer tinted. Gelatin POPs prints are difficult to distinguish from collodion prints, as the only distinguishing change for each is the binder material. A gelatin binder is very sensitive to high and low humidity, too low humidity will cause the gelatin to crack, while too high humidity will cause the gelatin to soften and stick together. It is also very sensitive to abrasion as deep scratches and abrasions will remove the image layer, exposing the baryta layer to damage.



**Fig. 3.** Gelatin POP Print, at Rasha Shaheen.

#### 1.1.3.4. Matte Collodion POP Print (1893 - 1920s)

Alternate Names: Collodion Silver Chloride POP, Collodio-Chloride Print, Aristotype, Aristo-Platino Print. A matte collodion POP print was produced from 1893 into the 1920s. It is a three-layer print comprised of a paper, baryta, collodion, and a silver image. The surface is a semi-matte. They ranged in color from gray-black to brownish black to purplish black. They were most often toned with gold and platinum. Therefore, their surface will not appear faded because the common use of stabilizing toners and the image exceptionally stable. They are sensitive to surface abrasion, showing white scratch marks from removal of the photo material and exhibiting a baryta layer. Collodion layer detachment may occur due to fluctuating relative humidity.



**Figure 4.** Matte Collodion POP Print, at A.C. Vroman, Private Collection, 1895.

## 1.2. Color Prints

### 1.2.1. Color Carbro Print (early 1900s – c. 1950)

Carbro prints were produced in the early 1900s through the 1950's. They were used in upscale advertisements such as fashion magazines until the 1960's. It is monochrome prints consist of a three-layer print (paper and an image with three pigmented gelatin layers). Each gelatin layer is printed from a B&W negative produced through a colored filter. Its manufacture depends on the treatment of layers, and then it is installed on a paper backing to issue a three-color image. The surface is shiny as a result of colored gelatin. Its most common defect is creases in the dyeing seams. Low relative humidity causes the gelatin layers to crack and is also sensitive to scratches. It is sensitive to high temperatures, which leads to fading of colors, so cold storage is recommended for her.



**Figure 5.** Color Carbro Print, by Shaheen

### 1.2.2. Dye-Transfer Print (1935 - 1994)

Alternate Names: Autotype Dyebro, Chroma Relief, Colour Snapshot, Colorol, Colorsnap, Condax-Dyetro, Curtis, D.I.P., Dornisthorpe, dye impression, Dye Transfer, Dyecolor, Dyetro, Flexichrome, Hess-Ives, Hicro, Hicrome, Jos-Pe, Orthotone, Pan-Chroma, Pinatype, Snager-Shepherd, Uvatype, Wash-Off Relief. Dye imbibition print also called dye-transfer print is a monochrome three-layer print comprised of a paper with a baryta layer and an image made up of yellow, magenta, and cyan dyes held in a single gelatin layer. The dye transfer process was first released in 1935 as the Kodak Wash Relief Process, then it was developed into a dye transfer process and named as the Kodak Dye Transfer Process in 1946. It is a very complex process that results in the control of color levels. Eastman Kodak stopped producing dye transfers in 1994, essentially discontinuing them. Although dye transfer prints are considered photographs, they are not the result of direct exposure to light. They are created by a series of layers of dye applied using a special dye transfer matrix film and each film has a gelatin layer, which varies in thickness according to the density of the image. It can be identified by the misalignment of the color pigment layers

that appear along the edges of the high- and low-intensity regions, and image details will appear soft under the magnifier and there are no discernible color particles. We notice that the barita layer is very thick, which obscures the view of the paper fibers. It is highly sensitive to light, as exposure to direct light causes the pigments to fade, so it is recommended to store them in a dark, low-humidity environment to preserve the pigments.

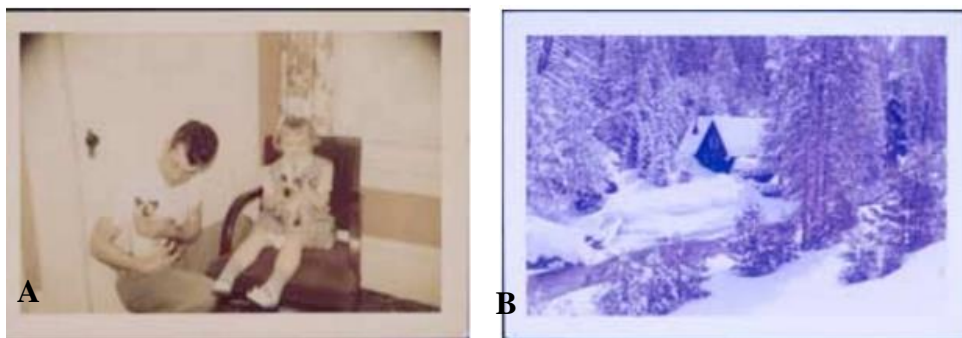


**Fig. 6.** Dye-Transfer Print, by Drewry Photocolor, IPI.

### 1.2.3. Chromogenic Color Print (1942 – present)

Color printing is a monochrome "full color" printing, which has many synonyms such as color printing process, dye printing, C print, Kodacolor, Ektacolor. It consists of a paper backing with a gelatin binder and an image composed of three pigment layers: yellow, magenta and cyan. Mostly, the stent is coated with resin. It was introduced in 1942 by Kodacolor, and is still in production today. In 1968, the production of polyethylene paper coated with titanium dioxide continues to this day. It consists of a paper backing with a gelatin binder and an image composed of three pigment layers: yellow, magenta and cyan. Mostly, the stent is coated with resin. It was introduced in 1942 by Kodacolor, and is still in production today. In 1968, the production of polyethylene paper coated with titanium

dioxide continues to this day. Chromogenic color prints are extremely sensitive to light and moisture, and some dye fading will appear even if kept in cool dark storage. Chromogene prints prior to the 1980s are highly susceptible to smudging due to dye instability which is caused by exposure to light, the yellow tinting occurring as a result of the fading of the magenta pigment. A reddish tint may appear as a result of the intense thermal fading of the unstable cyan hue. Therefore, cold storage is ideal for it.



**Fig. 7.** Chromogenic Color Print. A: Kodachrome 1954, B: Kodachrome 1960, by Weaver & Long

#### 1.2.4. Silver Dye-Bleach Print (1963 – c. 2011)

A silver dye-bleach prints (Cibachrome print, Ifochrome Classic print, and Dye destruction prints) were produced from 1963 to 2011. It is a monochrome three-layer "full-color" print comprised of a paper and an image made up of three gelatin layers, each containing an azo dye image: cyan, magenta, and yellow. All three layers of silver bromide gelatin emulsion are sensitive to different spectral region. They have vivid colors, high contrast, and minimal fading. The surface may be either semi-gloss ("pearl") or high-gloss. The resin coated paper has a back imprint from the manufacturer. Highly sensitive to water, contaminants, abrasion, and fingerprints, moisture will cause dye

carryover. The polyester backing is strong and provides image stability. However, the resin-coated support will curl, brittle and crack due to exposure to light and fluctuating RH.



**Fig. 8.** Silver Dye-Bleach Print, by Shaheen.

### 1.3. Instant Photos

#### *1.3.1. Instant Photo, B&W (1947 – 2008; limited production persists today)*

A black-and-white instant photo (also called internal dye diffusion transfer print, diffusion transfer, Polaroid) is a monochrome comprised of a paper or plastic (rare), gelatin, and silver image. B&W Instant Pictures were produced from 1947 through the late 2000s. The instant photography process was developed by Edwin Land, one of the founders of the Polaroid Corporation. The image is produced by an induced alkaline dye diffusion transfer process. It is characterized by its shiny surface. These prints are sensitive to abrasion, where the B&W instants fade around the edges and develop discolored spots throughout the print. These prints are resistant to abrasion, but are more susceptible to chemical contaminants. Image turns yellow, loss of detail, and increased sensitivity to abrasion as a result of damage. The white border around instant images should not be cut or removed, as it provides a barrier to atmospheric contaminants, and removing it would weaken the structural integrity of the image. Unmounted prints may wrinkle.





**Fig. 9.** Instant Photo, B&W, Edwin Land demonstrating the Polaroid Land camera, 1947, by the Baker Library Historical Collections.

### *1.3.2. Instant Photo, Color (1963 – 2008; limited production persists today)*

A color instant photo (other synonyms Internal dye diffusion transfer print, Polaroid, Polacolor, SX-70) is consist of a plastic support, gelatin, and silver and dye image. Color instant photos were produced from 1963 to 2008, where Polaroid Polacolor film was introduced in 1963 and the ubiquitous SX-70 integral film in 1972. Diffusion transfer with silver assists the creation of the image. It has a very glossy surface finish. Especially the integral format stands out due to its unproportional border, with the lower white border being larger than the others to accommodate the chemical pods used to process the image. Color shifting and fading is inevitable. Depending on the film type, abrasion and environmental pollutants will be more or less sensitive. The light fading stability of all instant photographs is poor due to their high sensitivity to light. There should never be any cutting, puncturing, or removing of the white border around instant photographs; it provides a barrier to atmospheric pollutants, and removing it would weaken the structure.



Fig. 10. Instant Photo, Color, by Peter Buse.

## 2. Monochrome print layers

The photoemulsion consists of a photosensitive photomaterial (such as silver halide) dispersed in a binder (gelatin, albumin, and collodion). The emulsion is carried on a paper or sometimes plastic backing.

Monochrome photographic prints fall into the three categories:

- One-ply (image-material only).
- Two-ply (image-material in a binder).
- Three-ply (image-material in binder over Baretta coating).

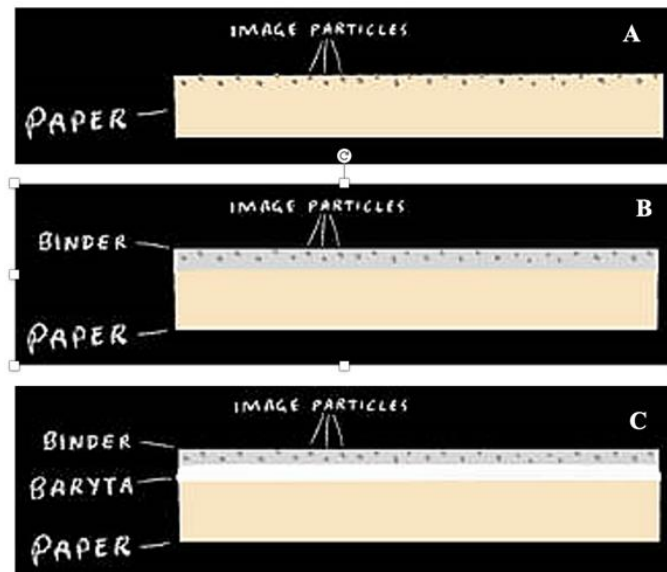


Fig. 11. Monochrome print layers. A: 1-Layer photographic print, B: 2-Layer photographic print, C: 3-Layer photographic print, Image by Ryan Edge.

### 3. Card mounts

The image of the card spread widely in the nineteenth century, and its types varied, including the *Carte de visite*, the Treasury card, and the Styro-Ukrainian card. While their sizes include those of:

- Trilby (2" x 2").
- Victoria (5" x 3")
- Promenade (7" x 4")
- Boudoir (8" x 5")
- Imperial (7" x 10").



**Fig. 18.** *Carte-de-visite*, by Lynch.

### 3.1. *Carte-de-visite*

*Carte-de-visite* is one of the most popular publications of the 1860s. It was produced in the late 1850s, but began to disappear in the early 17th century. It was most often produced from albumen prints, and in a few cases from carbon prints. Its dimensions are usually 11.4 x 6.4 cm. Her subjects were often portraits of celebrities and nature, with the background often bearing the name of the photographer and the address of the studio. It resulted in direct repetition of images due to the reproduction, but also produced sequences due to the recording of multiple sessions during a single session, the frequent return to the photographer's studio, and the re-contextualization of the images in different themed pages.



**Figure 12.** Carte-de-visite, A: front, B: back, by Shaheen, private collection

### 3.2. Cabinet Card

The cabinet card is a form of portraiture. It appeared after the *carte de visite* prints, and was in common use from 1868 until the 1890s. It differs from the prints of the *carte de visite* in dimensions, as its dimensions are 15.9 x 10.8 cm, and it was often produced from albumen. The name of the photographer and studio was usually written on the bottom edge of the card.



**Fig. 13.** Shows a cabinet card, by Shaheen, private collection

### 3.3. Stereocard

A stereocard photograph, which is also called a stereoview or stereograph, is intended to create three-dimensional images with the illusion of depth by emulating the stereoscopic nature of human vision. Stereocards consist of two images, which are captured using a camera with two lenses eye-width apart. Thus, two images are almost identical but taken from slightly different perspectives. In this technique, the left and right eyes are approximated from different viewpoints. A card (3–412" x 7") was used to mount the images. Each eye was forced to see only the image associated with the card using a special hand-held viewer (stereoscope). During the 1850s and 1920s, stereocards were very popular. The stereocard were first daguerreotypes, and later albumen prints. Stereograms that were painted on the front and back with watercolors or aniline dyes are called "Cosmoramas".

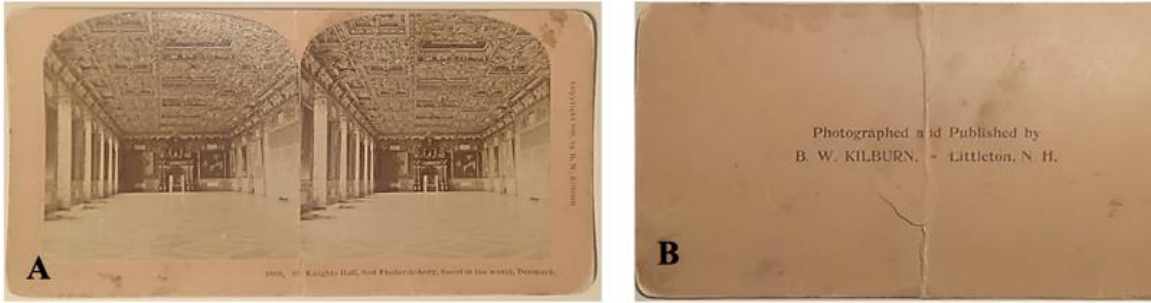


Fig. 20. Stereocard from albumen prints, A: front, B: back, by Shaheen, private collection

#### 4. Binder materials

##### 4. 1. Gelatin

Gelatin is the most common binder in photographic emulsions of the 20th century. It is a refined extract of animal feces (including bones, hooves, and skins). Due to the nature of the starting material, gelatin absorbs moisture and accelerates chemical degradation in humid conditions. Exposure to water and high humidity will cause the gelatin to expand and soften. Because of their organic composition, gelatin emulsions are susceptible to biodegradation, pest infestation and mold. Jelly bubbles and ripples are two forms of almost the same type of spoilage caused by a cyclical environment. Bubbling occurs when the gelatin emulsion bubbles or rises from the base in localized areas; Ripples occur when gelatin floats in larger sections and appears to be rippled at the edges.

##### 4. 2. Collodion

Colodione is a synthetic material formed from a chemical reaction of pure cellulose with nitric acid; the collodion binder is primarily cellulose nitrate, a moisture-resistant plastic film. Relative humidity and biodegradability are lower affects here more than other workbooks. However, high temperature and low relative humidity can cause brittleness and cracking of the binder, which is the greatest threat to the collodion emulsion. He is also very sensitive to abrasion, so that small scratches are often visible. Collodion paper has less impact on image degradation than gelatin or protein, but collodion on glass may show slight bubbles and wrinkles caused by Environments. Blistering occurs

when the binder blisters or lifts off the substrate at certain points; Ripples appear when the binder heaves into larger sections and appears to ripple at the edges.

#### 4. 3. *Albumen*

Albumen is a protein from chicken egg white with salt. This solution is spread evenly on a sheet of paper, dried, and then sensitized in a silver nitrate solution. Despite the main ingredient, protein, like gelatin, is susceptible to damage from parasites or microorganisms. The primary and most obvious form of protein degradation is yellowing of the highlights and edges of the image. Image discoloration often causes shadows density fades to yellow-brown and details are lost. Because it's denatured, the protein isn't as susceptible to moisture and moisture damage as gelatin. However, protein emulsions (especially after assembly) create small networks of cracks and fissures throughout the image.

### 5. Photo paper coatings

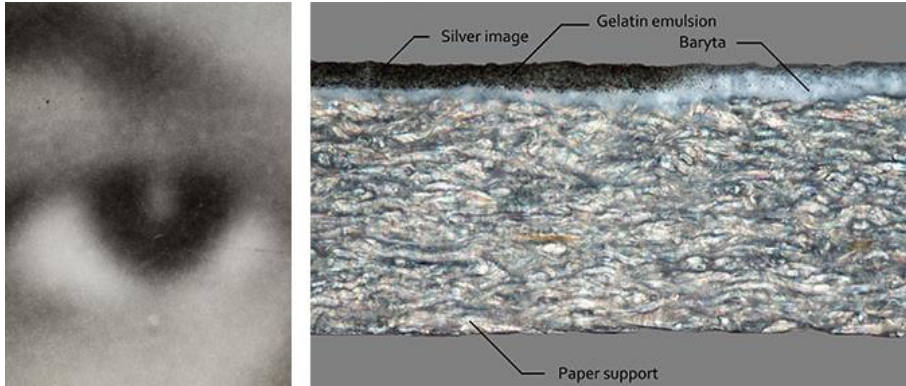
Paper fibers will be obscured behind baryta on fiber-based papers or a whitener on resin-coated papers, regardless of the coating. Prior to the adoption of coatings in the late impurities from the paper would spread to the image and cause severe fading and discoloration in the nineteenth century. To serve as buffers for the image material, paper coatings were added. The coatings on the earliest baryta papers may be thin or uneven. Fibers may be visible in such cases. The smooth, plasticized back sides of resin-coated prints make them easy to identify.

#### 5. 1. *Baryta (1890s – present; decline after 1960s)*

Baryta is an opaque surface coating that is applied to the paper support and beneath the image emulsion layer. Although other textures were created in the process, the primary purpose of this white pigment layer (barium sulphate dispersed in gelatin) is to provide a smooth and evenly white surface over the paper fibers. Furthermore, baryta reduces the penetration of the binder and/or image materials into the fibers, resulting in more even tonalities in the image. The thicker the baryta



application, the smoother and less visible the underlying paper fibers appear. Prior to 1900, papers may have had a thin, uneven baryta layer or none at all. Under low magnification, the trimmed (or dented) edges of the paper can reveal exposed underlying fibers.



**Fig. 21.** Layer structure of the gelatin silver print, we note that the baryta layer obscuring the paper fibers, at the Image Permanence Institute (IPI) 2022

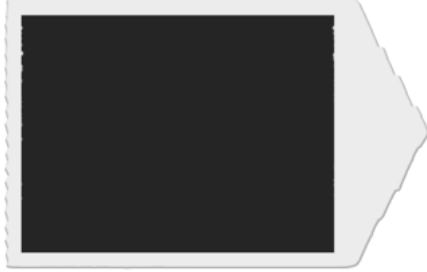
### 5. 2. Resin-coated (RC) paper (1968 – present)

Polyethylene resin coated paper, or "RC" paper, was intended to reduce deterioration rates for photo paper prints both from moisture and to reduce wrinkling and warping on paper backings, in addition to the benefit of faster curing during washing and drying. The side layer of the white print was mostly titanium dioxide particles. The high demand for resin-coated papers has led to it replacing baryta varnish. The prints used in these papers are highly sensitive to light, as titanium dioxide, when exposed to light, releases oxygen, which in turn attacks the polyethylene and thus leads to its fragility, and in the presence of fluctuations in the humidity, the emulsion ends up cracking and peeling. Therefore, it is recommended to store these prints in areas away from light and controlled by humidity.

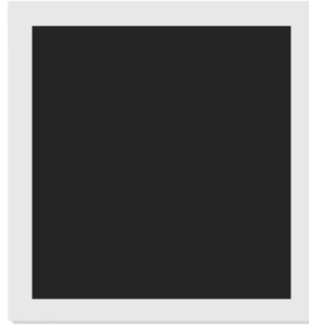
## 6. Instant Films Varieties

### 6. 1. Peel-Apart

Also called: Popular types. B&W (1948 – present): Polaroid 87, 611, 811; 52, 552, 612 (coated). Color (1963 – present): Polaroid Polacolor, Polaroid 20x24, 600, Time-Zero, Fuji FP-100, Fuji FP-800.



**Fig. 21.** Peel-apart print (Polaroid).



**Fig. 22.** Peel-apart print (Polaroid Polacolor).

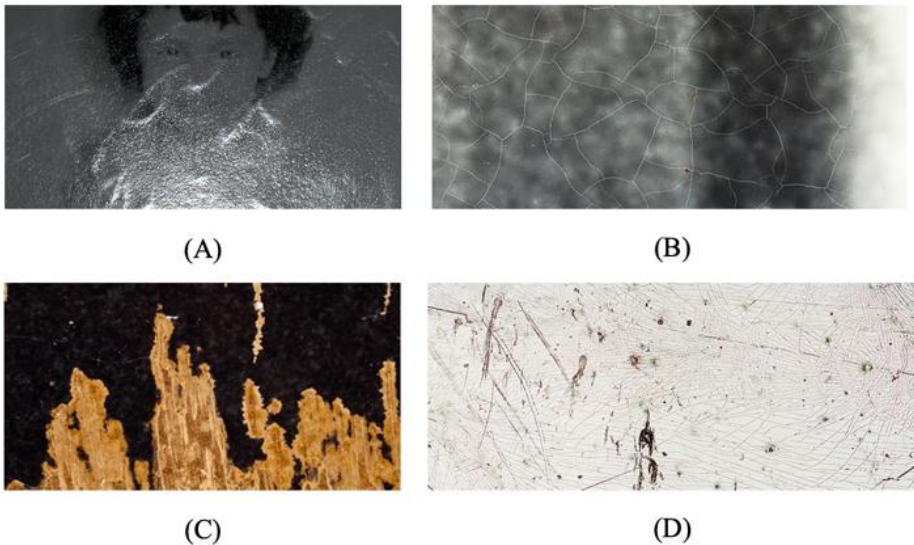


**Fig. 23.** Peel-apart Fujifilm FP-100C

Due to unstable yellow and magenta dyes, Polaroid's Polacolor colour process debuted with a relatively unsaturated dye composition. In 1975, Polacolor 2 was introduced, with more stable metallized dyes. The "Polacolor" backprint first appeared in 1968; "Z" or "E" at the end of an alphanumeric code may also help identify film type. If angled to reflect a light source off white matte border, adhesive remnants from where the negative sheet was once fixed are frequently visible. For their early peel-apart Polacolor prints, Polaroid also began packaging self-adhesive mount boards.

### 6. 2. Coated Peel-Apart

Also called: Popular types. Strictly B&W. This peel-apart print, originally known as the Polaroid Land process, requires a protective coating/stabilizer after processing. The image is separated from the negative film and then hand-coated. Until 1970, this protective polymer coater was required for all Polaroid B&W films. Every peel-apart print has a tendency to curl inward toward the image. An uneven spread of developer between the negative and receiving layers during processing can occasionally result in visible defects at the image's edge. In general, the peel-apart print is more stable than its integral counterpart. For hand-coated prints (all B&W before 1970), the image is extremely vulnerable to damage prior to application. However, once coated, the image is fairly stable. If the image is improperly coated, it may fade locally, with brownish-yellow streaking and fading. Overall yellowing is also common, especially in the highlights and borders of colour photo images.



**Fig. 24.** Coated peel-apart aspect of deterioration (magnification 50x). A: waves due to baryta over the paper. B: Microcracking in the connecting layer. C: Sulfiding along cracks in the coating layer. D: Microcracking in the coating layer, by IPI.

### 6. 3. Integral

#### Popular types

- Polaroid SX-70, Type 600, Type 778, Spectra, SpectraHD, 500, and 600 High Speed.
- Kodak PR-10, Kodak Instant Print Film, Kodamatic, Trimprint.
- Fuji Panorama, FI-10, Spectra, Captiva, Vision, iZone, Mio.



**Fig. 25.** Integral print (Polaroid, SX-70), by Shaheen



**Fig. 26.** Integral print (Kodak, PR-10), by Shaheen

Negative and positive are one unit that contains all processing chemicals and layers. The SX-70 integral colour format from Polaroid had up to thirteen interdependent layers. The image is surrounded by developing chemical pods, which accounts for the characteristic unproportionally white border. After 1968, it is common to see "Polaroid," "SX-70," or other film type back print. "Kodak" and "PR10" back prints may be present on the less common Kodak formats produced from 1976 to 1985. When exposed to high light levels, instant color will fade noticeably.

## Conclusion

The timeline study, which highlighted many categories like architectural, cultural, and natural heritage photography, provided insightful information on the development of heritage photography. The results of the study showed how changes in technology have affected how these types have been documented and preserved over time, highlighting the significance of heritage photography in preserving and documenting our rich historical and cultural heritage.

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