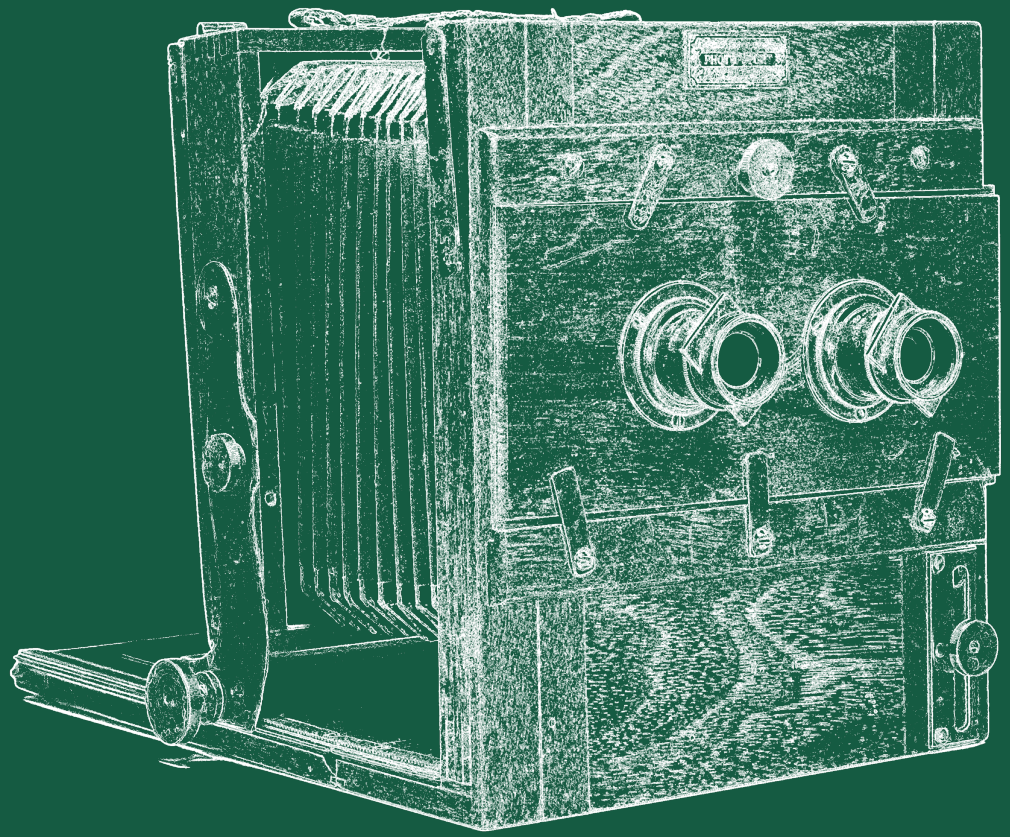

Stereoscopy History Series

Introduction

Stereoscopy

ANDRÉ RUITER

Stereoscopy

A journey through the birth and rise of stereoscopy, highlighting the instruments, processes and images.



The *Stereoscopy History Series* explores the history of stereoscopy in Europe between 1850 and 1930, unveiling the stories of the people, companies and their remarkable instruments and images that captured the imagination of an era.

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Stereoscopy

Stereoscopy is a technique used to create the perception of depth when viewing stereoscopic images. Our two eyes enable us to experience a three-dimensional world, caused by the small perspective differences between the left and right eyes. These are interpreted by the brain as “depth”. The perception of depth is called stereopsis.

With stereoscopy it is possible to simulate this process. The most popular way to create stereoscopic images is with a camera. With a conventional camera, stereoscopic images are made by taking one photo, slightly shifting the position of the camera and then taking a second photo. The distance between both positions is called the stereo baseline. The result is two nearly identical photos with only a slight difference in perspective caused by the two different camera positions, similar to the different positions of our eyes. These two pictures form a stereo pair.

A stereo camera has two lenses, which are mounted at some distance from each other. With a stereo camera, the two photos can be made simultaneously, without having to move the camera position. The main advantage compared with conventional cameras is that stereo cameras prevent motion between the two photo captures.

A developed stereo photo is called a stereoview, stereogram or stereograph. There are several ways to view a stereoview in 3D. The most commonly used method is by using a stereoscopic viewer, better known as a stereoscope. The stereoview is placed in the stereoscope, and both images of the stereoview can be viewed through two lenses: the left image with the left eye and the right image with the right eye. This process allows the viewer to see the image in 3D.



8.5 x 17 cm glass stereoview

Note the small perspective differences between the left and right image.

Invention and rise

The stereoscope was invented in 1832 and presented for the first time in 1838 by the Englishman Charles Wheatstone (1802–1875). Wheatstone's invention was a large reflecting stereoscope that could be used for viewing stereoscopic drawings, because photography would not be introduced until a year later with the presentation of the daguerreotype process. The combination of photography and the stereoscope would become decisive for the success of stereoscopy.

The Scotsman David Brewster (1781–1868) introduced an improved and more compact lenticular stereoscope in 1849. His design was met with little enthusiasm in the United Kingdom, and he found no manufacturer willing to produce his stereoscope. In 1850 he took his prototype to Paris and demonstrated it to the optician Jules Duboscq (1817–1886). Duboscq immediately saw the potential of the device and started producing and selling stereoscopes based on Brewster's design.

The first stereoviews to be produced on a relatively large scale were daguerreotypes. Daguerreotypes were unique and expensive and could not be easily reproduced. They fell into disuse in favour of the new collodion process that was introduced in 1851. Collodion negatives could be used to make multiple copies of the same image on paper and glass.

The Great Exhibition was held at the Crystal Palace in London in 1851. During the exhibition, Brewster presented a stereoscope to the British Queen Victoria. She was impressed by the three-dimensional images, and her enthusiasm was a great promotion for stereoscopy. Interestingly, the only source describing this event was Brewster himself and the story may therefore not be true[1]. However, the rise of stereoscopy started and would lead to a real stereoscopic craze called stereoscopomania from 1856 in the United Kingdom and France. Publishers started mass producing and selling stereoviews, and The London Stereoscopic Company boosted its sales with the slogan "no home without a stereoscope". In the mid-1860s, the craze started to fade and stereo photography slowly died out in the United Kingdom. A revival emerged in the United States and France around 1890.



Brewster-style stereoscope
8.5 x 17 cm paper and glass stereoviews
Jules Duboscq, France, c. 1855

The stereoscope has a rare pull-out drawer in which the stereoviews are placed.

Revival

Jules Richard (1848–1930) was an industrialist from Paris who specialised in precision instruments. He introduced the small 45 x 107 mm stereoview glass format and the Vérascope stereo camera in 1893. This new format allowed the design of compact and cheaper cameras and stereoscopes. Richard had momentum because his invention coincided with a growing period in which living standards were improving in France and the invention of the gelatin silver process in 1871 had simplified the making and development of photographs. A product line was created around the new format, with a wide range of cameras, stereoscopes and accessories in different price ranges. Richard became the leading brand of stereoscopy products and brought stereo photography within the range of amateurs. His product names, such as the Vérascope camera and the Taxiphote stereoscope, were commonly used as synonyms for stereo cameras and stereo viewers of all kinds. Other manufacturers in and outside France adopted the new 45 x 107 mm and larger 6 x 13 cm formats. Richard revived stereo photography in Europe. This revival flourished particularly in France and would last well into the 1930s.





Taxiphote Modèle Optique 45 x 107



Taxiphote Simplifié 45 x 107

The Taxiphote is a sophisticated multi-view tray-based stereoscope for viewing glass stereoviews. It was designed and manufactured by Jules Richard. The first model was introduced in 1900 and was initially named Stéréo Classeur[2]. The name Taxiphote was adopted shortly thereafter. The Taxiphote remained in production for 35 years, offering largely the same features throughout its lifespan. While the internal mechanism was gradually improved, the external design remained largely unchanged. The Taxiphote Simplifié was introduced in 1908. It offered fewer features but was available at a lower price. The Taxiphote set the benchmark and inspired other manufacturers to develop similar devices.

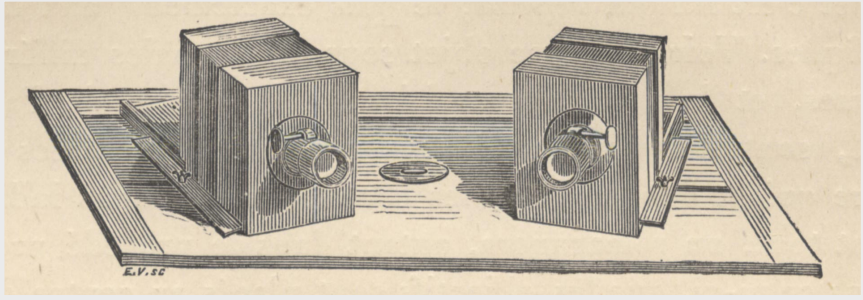
Stereo cameras

Before the introduction of the stereo or binocular cameras, the two photos that form a stereo pair were made with conventional single-lens cameras. Josiah Latimer Clark (1822–1898) presented in 1853 a camera that was mounted on a board with grooves that allowed the position of the camera to be changed quickly and consistently between the taking of the two photos. Stereo photos were also made by using a setup of two similar cameras that captured the two images simultaneously. The first stereo camera was patented in 1856 by John Benjamin Dancer (1812–1887).

The main difference with a conventional camera is that a stereo camera has two lenses. When the distance (baseline) between the lenses is 65 mm, it is equivalent to the average distance between the two eyes of a human. Earlier stereo cameras could have a larger baseline.

The early photography processes required long exposure times. Exposure was controlled by removing and replacing the lens hoods of the camera's lenses. When using a stereo camera, it was important that both photos that formed the stereo pair had identical exposure times. In the 1860s, stereo cameras could be equipped with simple shutters. Hinged flaps on the lenses or a swivelling plate were manually operated and could uncover and cover the lenses simultaneously. With the improvements of photographic processes, shorter exposure times became possible in the late 19th century, and more advanced shutters were developed that could precisely control the exposure. To prevent one image overlapping the other, a curtain (septum) was mounted in the camera body between the two lenses.

Even after the introduction of the stereo camera, many photographers continued to work with one or two single-lens cameras to take stereo photos. The advantage was that the photographer could choose a larger stereo baseline, resulting in a greater depth effect. Stereo photos with a large baseline are called hyperstereos.



Making a stereo photo with two conventional cameras
A. L. Donnadieu, *Traité photographie stéréoscopique*, 1892



No. 402 Chambre Stéréoscopique
9 x 18 cm glass plate negatives
Photo Vulgarisatrice, France, c. 1900



Reicka
10 x 15 cm glass plate negatives
Emil Wünsche, Germany, c. 1907



Stéréocycle

6 x 13 cm glass plate negatives

Bazin and Leroy, France, c. 1901



Vérascope No. 6bs

45 x 107 mm glass plate negatives

Jules Richard, France, 1921



Glyphoscope Modèle 1
45 x 107 mm glass plate negatives
Jules Richard, France, c. 1908



Plaskop Model 603
45 x 107 mm glass plate negatives
ICA, Germany, 1922–1924

A woman and her Vérascope

This 6 x 9.5 cm carte-de-visite shows a woman with her Vérascope camera and the accompanying camera bag. It is a rare image, because photos of women with a camera were a rarity in an early 20th century society that was dominated by men.

A carte-de-visite consisted of a small portrait photograph that was printed on albumen paper. The print was pasted on a larger piece of cardboard. Carte-de-visites had the appearance of visiting or business cards, but they were used as affordable portrait photos that could be shared with family and friends. Carte-de-visites of celebrities were collectors' items.

The French photographer André Adolphe Eugéne Disdéri (1819–1889) filled the first carte-de-visite patent in 1854. His patent involved a system of capturing 10 photos on a single glass plate negative, which made the carte-de-visite affordable and easy to reproduce. The inexpensive reproduction of carte-de-visites in great quantities slowly faded the stereoscopy craze in the late 1850s, and boosted a new carte-de-visite craze. Disdéri became the victim of his own invention. His system was easy to imitate, and photographers all over the world started making carte-de-visites. Disdéri died as a poor man in a hospital in Paris.



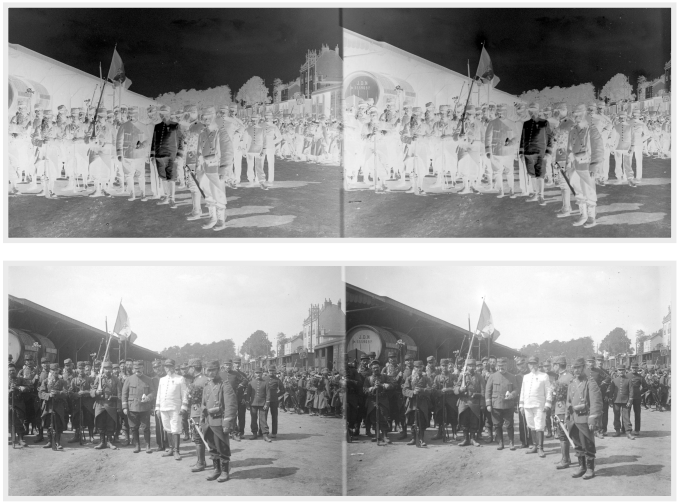
Development process

Capturing a photographic image by early photographic processes was done by exposing light-sensitive material to light, while taking a photo with a camera. Photosensitive material consisted of silver halides, a combination of silver and chloride, bromide or iodide. The photosensitive material was sometimes attached to a support layer by binding material, such as albumen or gelatin.

Most processes created a latent image after the camera exposure. This was a weak image that was not yet visible, but it was strong enough to be further processed through chemical development. The advantage was that the camera did not have to expose until the entire image was visible, which would result in long exposure times. The exposed plate was developed with a developer which made the latent image visible. The remaining silver halides were then removed to prevent the image from darkening. This process was called fixing, and sodium thiosulfate was usually used as a fixer. Finally, the fixer residues were rinsed out. Negative-positive processes created a “negative” image that could be used to make multiple “positive” copies of the same image. Light parts of the photographed subject appeared dark on the negative, because there was a lot of dark silver there. The dark areas of the subject appeared bright, because unexposed silver halides were removed during fixing and rinsing.

In a direct positive process, such as daguerreotype or autochrome, the positive final image was produced immediately during development. The drawback was that these images were difficult to reproduce.

An overview of the most common negative, positive, and direct positive processes between 1839 and 1930 can be found in the chapter *Overview photographic processes*.



A negative and the developed positive image.

Stereo photography required an extra step during the development process to make the images suitable for viewing with a stereoscope. When a subject was photographed with a conventional camera, the image was captured "upside down". After rotating the plate, it would appear as a normal image. When a photo was made with a stereo camera, this meant that when the plate with the stereo pair was rotated, the left and right images were reversed. When such an image was viewed in a stereoscope, the objects in the background stood out in front and the objects in the foreground were pushed to the background. This caused a pseudoscopic effect and did not show a natural representation of the captured subject. To get a natural 3D representation, the images needed to be transposed. The image on the right was moved to the left side, and the image on the left was moved to the right side during the printing of the image.



Inverseur automatique
A device for transposing stereo glass plate negatives to stereoviews, made by Jules Richard.

© Collection Martiné

Le Posographe

The required camera exposure time for a photo depended on the available light, the lens aperture and the photosensitive emulsion. The latter in particular was an incalculable factor in the early years of photography, since the emulsion was prepared by the photographers themselves. With the introduction of the gelatin silver process, pre-prepared negative plates were made available commercially. This allowed for more standardised emulsions, but calculating the correct exposure time remained challenging. Photographers used exposure tables or simply made a best guess based on their experience.

Auguste-Robert Kaufmann patented in 1922 the design of an exposure calculator, that was introduced under the name Le Posographe. The calculator consisted of a metal plate surrounded by a 13 x 8 cm frame. The plate was printed on both sides. One side contained the exposure settings for outdoor photography; the other side showed the settings for indoor photography. Six metal sliders were mounted on the frame. The sliders set the exposure variables, such as lens aperture, month, time of the day and cloudiness. The large slider was the output slider and showed the exposure time. The output slider had four indicators to support multiple emulsions, including autochromes. The exposure time went from 1/1000 sec. to 12 sec. All sliders were mechanically connected to each other. Moving one of the input sliders would shift the output slider immediately. Le Posographe was a clever design and became a great success.



Le Posographe with outdoor settings.

Stereoviews

A stereoview is the final result of the photographic development process and can be viewed using a stereoscope. Stereoviews can be characterised by their size and support layer. Many early stereoviews had a size of approximately 8.5 x 17 cm, which became an unofficial standard, but many "exotic" stereo formats exist. The following is a quote from the 1922 catalogue of stereoscope manufacturer Mattey:

> Hand-held stereoscopes are manufactured for different formats, from 45 x 107 to 13 x 18. The most used formats, 45 x 107, 6 x 13 and 8.5 x 17, are, barring rare exceptions, always in stock; the other formats 7 x 13, 7 x 15, 9 x 14, 8 x 16, 11 x 15, 12 x 16.5, 13 x 18, although in the catalogue, are not always in stock and are only manufactured on demand.

Stereoviews on metal

The earliest stereoviews that were made on a fairly large scale were daguerreotypes. A daguerreotype consists of polished silver that is applied to a copper plate. Viewing a stereo daguerreotype can be challenging. The image on the mirror-like silver can cause reflections, which distort the viewing experience and depth effect. Special viewing cases were introduced in the 1850s to overcome this problem. A daguerreotype is often covered with a glass plate for protection, but this plate can also be decorated with a black passepartout and golden fillets. The two layers are fixed by binding tape. The general size of a stereo daguerreotype is approximately 8.5 x 17 cm, but other sizes exist. Another process that used metal as a support layer was the tintype process. Tintypes were printed on iron plates, but the process was less popular for creating stereoviews.

Stereoviews on glass

Duboscq extended the Brewster-type stereoscope in 1852 by attaching a frosted glass plate to the back of the device to illuminate glass stereoviews. He paved the way for glass stereoviews, which would become a French specialty. Glass stereoviews are also called transparencies or diapositives.

The early glass stereoviews measure about 8.5 x 17 cm. Later slides also have a larger size of 9 x 18 cm. The early stereoviews consist of two or three layers of glass. The extra layer(s) protect the glass plate that contains the photographic emulsion. A frosted glass (verre dépoli) behind the photographic layer hides the background and illuminates the slide equally. The early views often have the same decorative style as daguerreotypes. Ferrier père, fils & Soulier became a renowned publisher of high-quality 8.5 x 17 cm glass stereoviews in France and abroad.

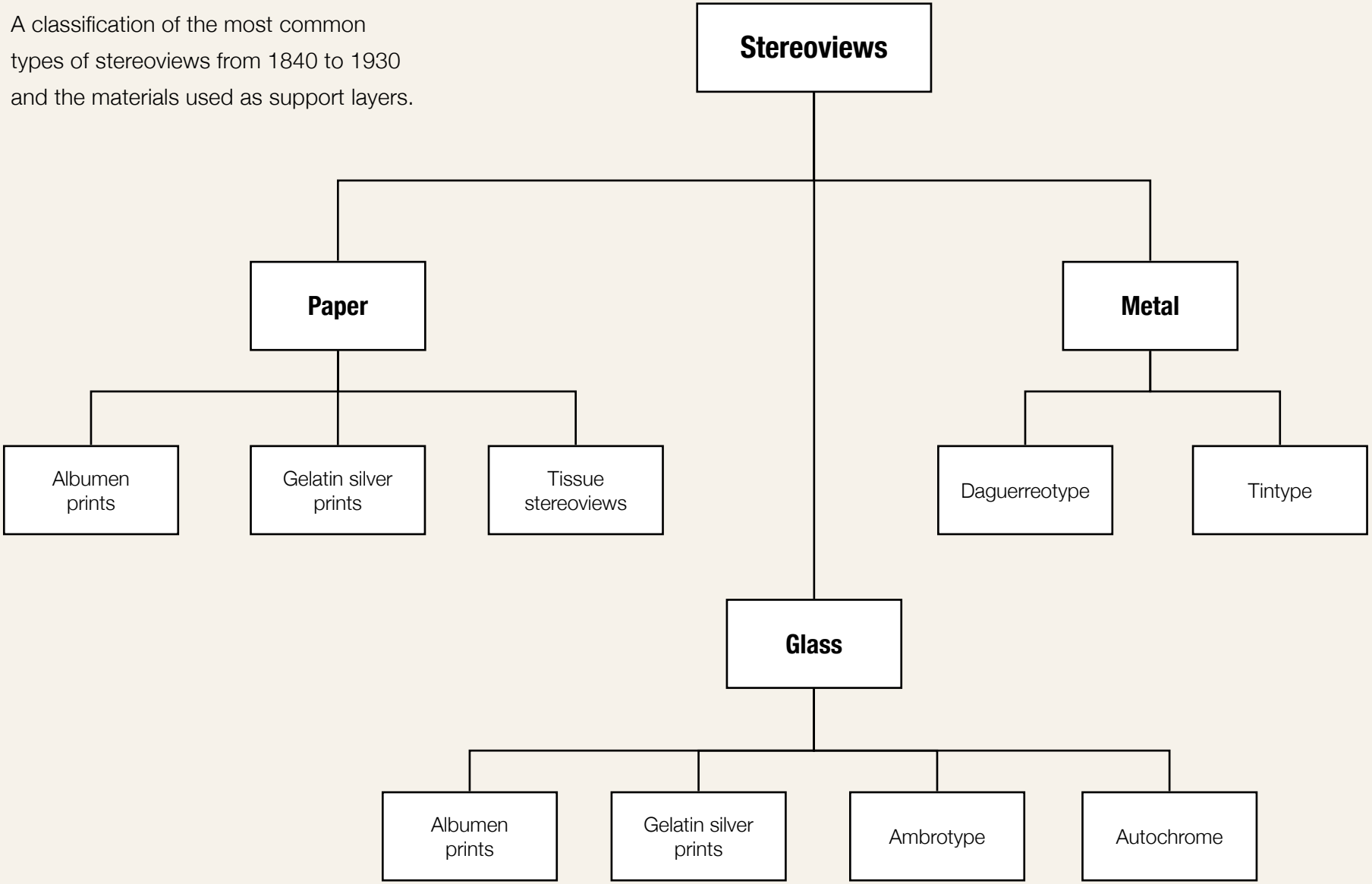
The large exclusive glass stereoviews were replaced by the smaller 45 x 107 mm and 6 x 13 cm formats in the 1890s. The images of the smaller formats are printed on a single glass layer, without protective cover plate. This makes the photographic emulsion more exposed to scratches and moisture, but they were easier and cheaper to manufacture, especially for the amateur market. Small format glass stereoviews with a protective glass layer are less common. Special types of glass stereoviews are stereo ambrotypes and autochromes.

Stereoviews on paper

The vast majority of stereoviews are printed on paper. Most paper stereoviews are printed on a thin layer of paper that is mounted on thicker cardboard. The large 8.5 x 17 cm and 9 x 18 cm formats of glass stereoviews remained popular for paper stereoviews until the 1930s, but smaller views were also published.

A special variant of paper stereoviews are paper transparencies, better known as tissue stereoviews or French tissues. They were introduced in France in 1858. An image is printed on a thin layer of paper, followed by the addition of coloured paint to the back. A thin layer of tissue paper is added to the back to hide the colours and diffuse the light. The two layers are sandwiched between a cardboard frame. With reflective light, a tissue stereoview looks like a normal image. When it is lit from behind, the added colours become visible. Sometimes new details are revealed in the so-called “surprise tissues”. A stereoscope that supports the viewing of both paper card stereoviews and glass stereoviews is needed to fully enjoy a tissue stereoview.

A classification of the most common types of stereoviews from 1840 to 1930 and the materials used as support layers.





8.5 x 17 cm hand-coloured daguerreotype
Antoine Claudet, England, March 1857

Daguerreotypes were black-and-white images and, as such, did not appeal to everyone. To compete with the colourful paintings of the time and satisfy customers, the images were sometimes hand-coloured. Colouring stereo daguerreotypes required skilled artists, as both images had to be coloured identically to preserve the stereo effect. Claudet was renowned for the high quality of his hand-coloured daguerreotypes.



8.5 x 17 cm tintype
Probably United States, c. 1870



8.5 x 17 cm ambrotype
c. 1870



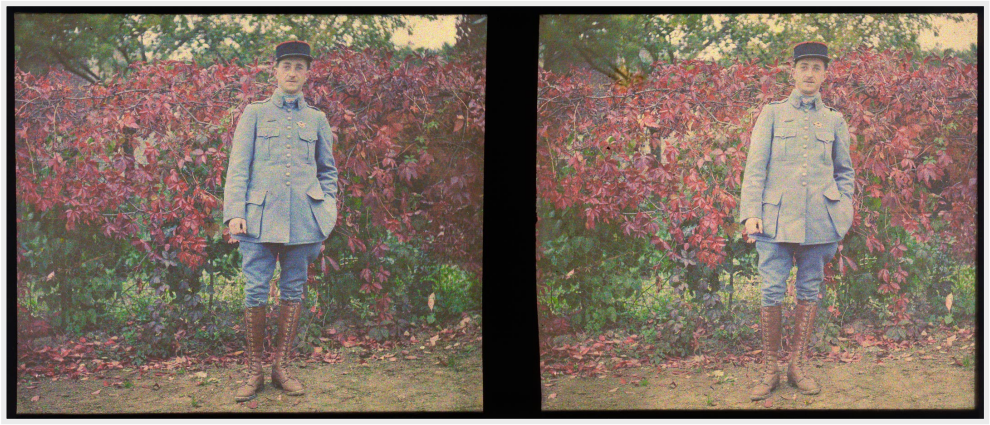
8.5 x 17 cm albumen on glass
Claude-Marie Ferrier, Italy, c. 1860



6 x 13 cm gelatine silver on glass
France, 1914–1918



45 x 107 mm gelatine silver on glass
France, 1914–1918



6 x 13 cm autochrome
France, 1914–1918



8.5 x 17 cm albumen print
Félix Bonfils, Egypt, c. 1870



8.5 x 17 cm gelatin silver print
Jean Agélou, France, c. 1910





8.5 x 17 cm tissue transparency
Alexis Gaudin, France, c. 1860

The interior of a stereoview manufacturing workshop. It might be the workshop of stereoview publisher Alexis Gaudin, an early stereoscopy pioneer in France.

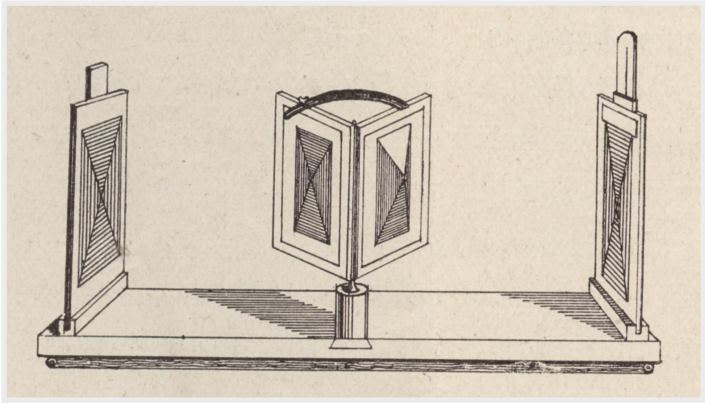
The left image shows the paper tissue stereoview as seen by reflective light. The right image shows how it looks when it is lit from behind.

Stereoscopes

The viewer that was presented by Charles Wheatstone in 1838 was a reflecting stereoscope. A reflecting stereoscope uses mirrors to view stereoviews in three dimensions. Because of their size, reflecting stereoscopes are impractical compared with the compact refracting and lenticular stereoscopes. The prisms of early refracting stereoscopes were replaced by lenses later. Lenses have the ability to magnify an image, which enhances the viewing experience. Most lenticular stereoscopes have the option of focusing the lenses, but cheap or compact viewers may lack this functionality. More advanced stereoscopes might also have the option of inter-ocular adjustment, which adjusts the distance between the lens tubes to support different eye widths.

When looking at the construction, there are three types of stereoscopes. The hand-held stereoscope is a compact viewer. Many of these viewers are based on the lenticular stereoscope design that was introduced by Brewster in 1849, and these viewers are referred to as Brewster-type stereoscopes. Tabletop stereoscopes are larger and heavier and must be placed on a table or desk. The largest stereoscopes are the floor-standing models. These were ideally suited for use at exhibitions and could hold 100 or even 200 stereoviews.

Viewers can be open or have an enclosed boxed housing. Closed box stereoscope designs are equipped with a hinged lid that is opened to illuminate paper stereoviews with reflective light. The inner surface of the lid is provided with silvered-paper and later a mirror to intensify the light. A frosted glass at the rear of the stereoscope is intended to illuminate glass stereoviews with transmissive light. Many viewers have both a hinged lid and frosted glass to support both stereoview types. The interior of the body is painted with matte black to absorb ambient light and prevent reflections.



Wheatstone's reflecting stereoscope
E. Couset, *La photographie stéréoscopie*, 1925

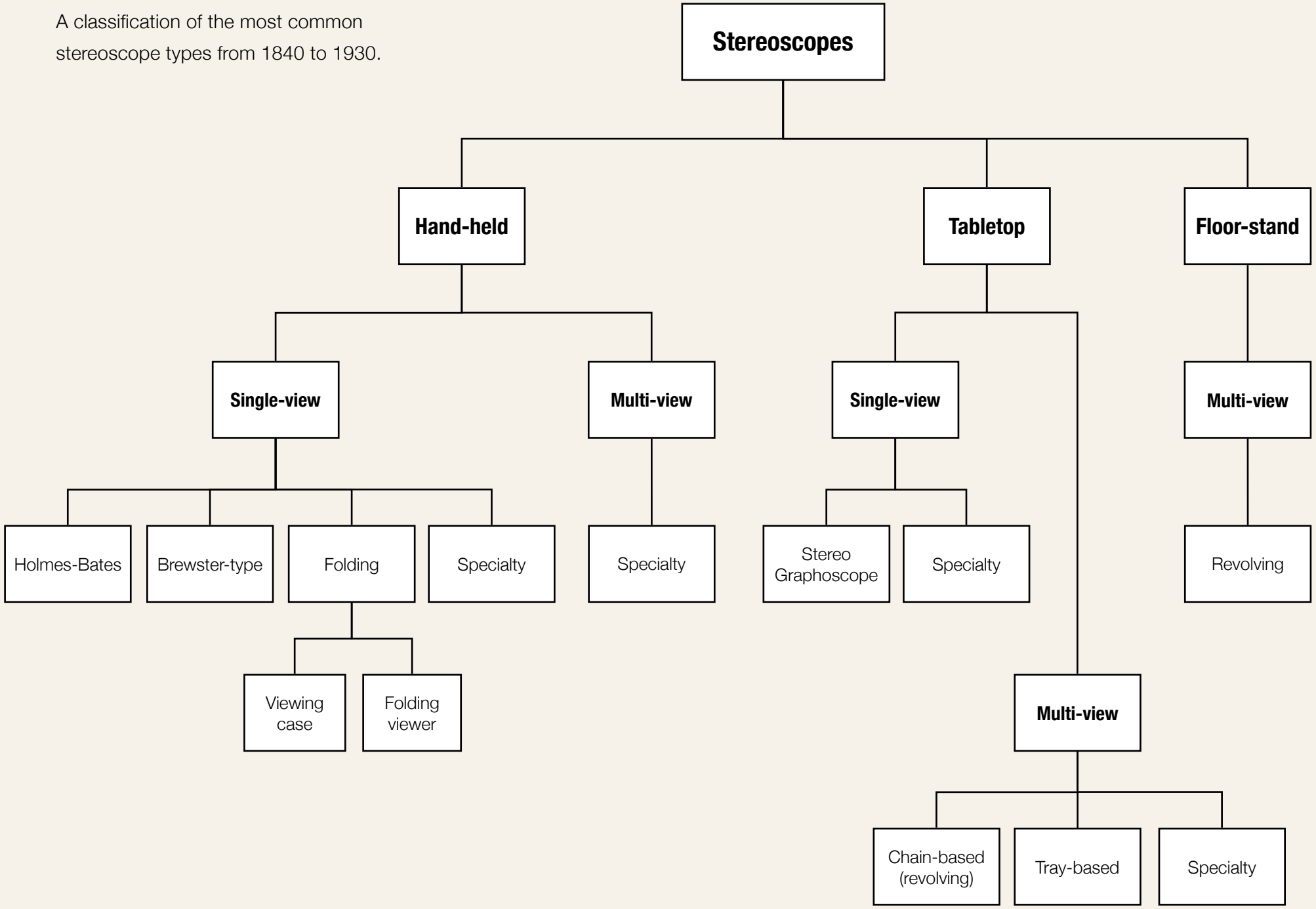
Stereoscopes can support different viewing experiences. With a single-view stereoscope, the stereoviews are placed, viewed and replaced one-by-one. By contrast, a multi-view stereoscope allows several stereoviews to be viewed in succession by turning a knob or crank or by moving a lever. The first popular multi-view stereoscopes had stereoviews holders that were attached to a rotating belt or chain. These chain-based or revolving stereoscopes were based on the 1857 patent of Alexander Beckers (1815–1905) from the United States.

The popularity of glass stereoviews in France resulted in the introduction of a new type of multi-view stereoscope that used slide trays, and this type was only suitable for viewing glass stereoviews. The first patented design dates from 1899. It became the design for Jules Richard's famous Taxiphote stereoscope. Other manufacturers followed Richard and designed similar devices. Most tray-based stereoscopes share common design principles, but variations in approach and mechanism exist. The general operation of common tray-based stereoscopes is as follows: the glass slides are placed in a wooden, metal or bakelite tray which is placed into the device. When operating the stereoscope, a glass slide is lifted or pulled out of the tray and placed in front of the lenses. The slide is then placed back, the tray is moved further and the next slide is loaded. Some designs have a mechanism to quickly jump to a specific slide in the tray. Tray-based devices are the most advanced stereoscopes and offer the best viewing comfort.



Hemdé Série I tray-based stereoscope

A classification of the most common stereoscope types from 1840 to 1930.



Hand-held stereoscopes





Stéréoscope pliant en cuivre nickelé
Type: hand-held / single-view / folding

6 x 13 cm glass and paper stereoviews
Mattey, France, c. 1920



Perfecscope
Type: hand-held / single-view / Holmes-Bates

8.5 x 17 cm paper stereoviews
H.C. White Co, United States, c. 1890

The design of this simple and affordable viewer was first conceived around 1860 by the American poet Oliver Wendell Holmes Sr. He chose not to patent his invention, allowing others to freely develop and improve upon it. The design was later refined by Joseph L. Bates, and the viewer became widely known as the Holmes-Bates stereoscope.



Type: hand-held / single-view / Brewster-type

9 x 18 cm glass and paper stereoviews
Antoine Claudet, England, c. 1855



Stéréoscope Standard
Type: hand-held / single-view / Brewster-type

6 x 13 cm cm glass and paper stereoviews
Mattey, France, c. 1930



Stéréoscope en Ivorine
Type: hand-held / single-view / specialty

45 x 107 mm glass stereoviews
Mattey, France, c. 1925



Mirror stereoscope
Type: hand-held / single-view / specialty

8.5 x 16 cm paper stereoviews
R & J Beck, England, c. 1860

The Mirror stereoscope was specially designed
to view stereoviews that were tipped in a book.



Kilburn viewing case
Type: hand-held / single-view / viewing case

11.5 x 8 cm daguerreotype
William Edward Kilburn, England, c. 1855

The viewing case was designed by William Edward Kilburn (1818–1891), an English daguerreotypist renowned for his expertly hand-coloured daguerreotypes. Kilburn created the foldable case specifically for stereo daguerreotypes. The case was manufactured exclusively by Moran and Quin in London and sold to daguerreotypists, who could customise it with their own names.



The case shows a hand-coloured daguerreotype.



Le Nain
Type: hand-held / multi-view / specialty

45 x 107 mm glass stereoviews / 25 views
Mattey, France, c. 1910

Le Nain is a rare hand-held multi-view stereoscope. A small lever on the right side of the viewer is positioned between two toothed metal strips. Pushing the lever upwards and forwards advances the tray along a rail, bringing a glass slide into position. The entire device must then be rotated counter-clockwise, allowing the slide to drop from the tray by gravity and come to rest in front of the lenses. Turning the device clockwise causes the slide to fall back into the tray.



Le Merveilleux
Type: hand-held / single-view / folding

9 x 14 cm paper stereoviews
Le Deley, France, c. 1905

Tabletop stereoscopes



Verant
Type: tabletop / single-view / specialty

9 x 15 cm paper and glass stereoviews
Carl Zeiss Jena, Germany, c. 1905



Graphoscope
Type: tabletop / single-view / stereo graphoscope

8.5 x 17 cm paper and glass stereoviews
Negretti and Zambra, England, c. 1870

The graphoscope design was patented on 1 February 1864 by Charles John Rowsell. It was a bulky viewer, equipped with a large magnifying lens for examining photographs or postcards. A later variant featured an additional panel with stereo lenses and became known as the stereo graphoscope.





Vérascope Richard
Type: tabletop / multi-view / chain-based

45 x 107 mm glass stereoviews / 50 views
Jules Richard, France, c. 1920

Type: tabletop / multi-view / chain-based

8.5 x 17 cm paper stereoviews / 50 views
Patrick Meagher, England, c. 1860



Planox Stéréoscope Magnétique
Type: tabletop / multi-view / tray-based

6 x 13 cm glass stereoviews / 20 views
Plocq, France, c. 1925

The Planox retrieves the stereoviews from the tray using a magnetic pickup. Each slide must therefore be fitted with a small metal strip at the top.



Stéréodrome
Type: tabletop / multi-view / tray-based

6 x 13 cm glass stereoviews / 20 views
Léon Gaumont, France, c. 1910



Le Multiphote
Type: tabletop / multi-view / specialty

45 x 107 mm glass stereoviews / 20 views
Lucien Bize, France, c. 1910

This viewer can display multiple glass stereoviews in succession without the use of a complex mechanism.



Stereospekt
Type: tabletop / multi-view / specialty

45 x 107 mm glass stereoviews / 12 views
ICA, Germany, c. 1920

The slides are mounted in a metal harmonica-style belt. By pressing a small lever on the right side, a holder containing a slide is released and drops into position in front of the lenses.



Manufacturers of stereoscopes offered optional furniture for storing large collections of stereoviews.

The stereoscope on the cabinet is an Achromatic Stereoscope by R & J Beck.

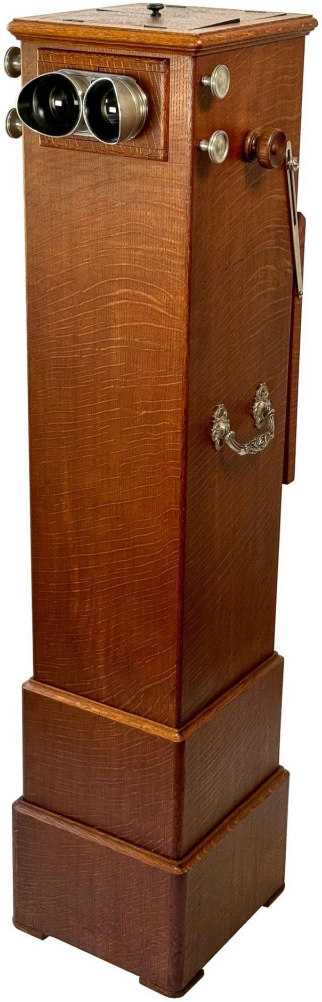
© Collection Martiné

Flour-standing stereoscopes



Type: flour-stand / multi-view / chain-based
7 x 15 cm paper and glass stereoviews / 200 views
Mattey, France, c. 1925

© Collection Martiné



Type: flour-stand / multi-view / chain-based
8.5 x 17 cm paper and glass stereoviews / 200 views
France, c. 1910

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Stereoscopy timeline

1827
Joseph Nicéphore Niépce (1765–1833) made the first photographic image.

1832
Charles Wheatstone (1802–1875) invented the stereoscope. He designed a large reflecting stereoscope and a compact open refracting stereoscope.

1838
Wheatstone presented his stereoscopes.

1839
Louis Jacques Mandé Daguerre (1787–1851) introduced the daguerreotype process. It marked the beginning of the photography era.

1840
Henry Fox Talbot (1800–1877) made the first stereo photographs at Wheatstone's request.

1847
Claude Félix Abel Niépce de Saint-Victor (1805–1870) introduced the albumen negative process.

1848
Frederick (1809–1879) and William (1807–1874) Langenheim made their first glass transparencies for the magic lantern.

1849
David Brewster (1781–1868) introduced a compact closed box lenticular stereoscope.

1850
Louis-Désiré Blanquart-Évrard (1802–1872) introduced the albumen print.

Brewster presented his stereoscope to Louis Jules Duboscq (1817–1886). Duboscq started manufacturing Brewster-type stereoscopes.

1851

Duboscq was introduced to the magic lantern glass slides of the Langenheim brothers at the 1851 Great Exhibition in London. The slides inspired him to create glass stereoviews.

Frederick Scott Archer (1813–1857) introduced the wet plate collodion process. Reproducing images on albumen paper or glass from a collodion negative became decisive for large-scale production and distribution of paper stereoviews from around 1856.

1852

Duboscq patented a stereoscope with a frosted glass in its base to view glass stereoviews.

The first glass stereoviews were made by Claude-Marie Ferrier (1811–1889) and published by Duboscq.

1853

Adolphe Alexandre Martin (1824–1896) described the tintype or ferrotype process.

Folding stereoscopes or viewing cases were introduced by Antoine François Jean Claudet (1797–1867), William Edward Killburn (1818–1891) and others.

1853

Josiah Latimer Clark (1822–1898) presented a system to make stereo photos with a single lens camera.

1854

Jacques-Athanase-Joseph Clouzard and Charles Soulier (c.1840–c.1876) patented their two-piece glass stereoview design.

James Ambrose Cutting (1814–1867) patented the ambrotype process.

George Swann Nottage (1823–1885) established the London Stereoscopic Company.

1855

Alexis Gaudin (1816–1894) and Charles Gaudin (1825–1905) established Alexis Gaudin et frère.

Claudet patented adjustable stereoscope tubes for people with different eye sights and eye widths.

1856
John Benjamin Dancer (1812–1887) patented the first double-lensed stereo camera.

1857
Alexander Beckers (1815–1905) patented a design for a multi-view chain-based or revolving stereoscope.

1858
Paul Émile Chappuis (1816–1887) introduced the first tissue stereoviews.

1859
Ferrier père, fils & Soulier was established.

1864
Charles John Rowsell patented the graphoscope.

1871
Richard Leach Maddox (1816–1902) introduced the gelatin silver process.

1893
Jules Richard (1848–1930) introduced the small 45 x 107 mm stereo glass format and Vérascope camera.

1894
Frederic Eugene Ives (1856–1937) patented the design for the Kromskop, a stereoscope that joined the images of three identical stereoviews through colour filters to a full colour image.

1899
Richard patented a design for the Taxiphote tray-based multi-view stereoscope.

1907
Auguste Lumière (1862–1954) and Louis Lumière (1864–1948) introduced Autochrome Lumière to the market. It was the first practically applicable colour photography process.

Photographic processes

	Daguerreotype	**Calotype**	**Albumen negative**
Introduction:	1839	1841	1847
Inventor:	Louis Jacques Mandé Daguerre	Henry Fox Talbot	Claude Félix Abel Niépce de Saint-Victor
Alternative names:	-	Talbotype	-
Common use:	1839–1860	1841–1860	1847–1860
Process type:	Direct positive	Negative	Negative
Surface layer:	Silvered copper plate	Paper	Glass
Characteristics:	The image was on a mirror-like silver surface and would appear either positive or negative, depending on the angle at which it was viewed and whether a light or dark background was being reflected in the metal. Images were laterally reversed (left was right, right was left). The black-and-white daguerreotypes were sometimes hand-coloured.	The texture and fibres of the paper negatives were visible in prints made from it. The prints were grainy or fuzzy compared with daguerreotypes, which were sharp and clear.	Albumen negatives had a greater resolution and were sharper than the later introduced and popular collodion negatives. It was a dry plate process and negatives could be prepared long before use and could also be developed later. The downside was that exposure times were very long, sometimes more than ten minutes.
History:	The French government acquired the rights from Daguerre and presented the process in 1839 as a gift “free to the world” (England was excluded). The initial process required long exposure times and was only suitable for still lifes. After optimisations, daguerreotype became suitable for making portraits.	Calotype was the first applicable negative-positive process. Despite this advantage, the patent restrictions prevented the process from becoming as popular as daguerreotype, which could be used freely. Calotype was not often used for making stereo photos.	The albumen negative process was popular in France and used by photographers such as Claude-Marie Ferrier and Jules Couppier to create exclusive glass stereoviews.

	Collodion negative	Ambrotype	Tintype
Introduction:	1851	1850	1853
Inventor:	Frederick Scott Archer	Louis-Désiré Blanquart-Évrard	Adolphe Alexandre Martin
Alternative names:	Wet plate	Amphitype	Ferrotype
Common use:	1851-1885	1852-1870	1853-1930
Process type:	Negative	Direct positive	Direct positive
Surface layer:	Glass	Glass	Iron
Characteristics:	Collodion negatives offered very good sensitivity, which allowed shorter exposure times. The downside was that it was a cumbersome process. It required that the photographic material remained more or less wet during the sensitising, exposing and development of the plate. This was not a problem in a studio, but when photographers were shooting outdoors, they had to take their entire darkroom with them.	Ambrotype was a variation of the collodion process. An underexposed collodion negative was placed on a dark background after which a positive image appeared. Like daguerreotypes, ambrotypes were laterally reversed.	Tintype was a variation of the collodion process. A sheet of iron was coated with dark brown or black varnish, followed by a coating of collodion. The plate was exposed in the camera and developed immediately while the collodion was still wet. The result was a negative image, but because of the used dark varnish, the image appeared as a positive image. Tintypes were laterally reversed.
History:	Collodion was the first commercially successful negative process. The combination of collodion negatives and albumen prints allowed cheap reproduction of images with good quality.	The appearance of a collodion negative as positive was first noticed by Louis-Désiré Blanquart-Évrard in 1850. The process was popularised by James Ambrose Cutting after whom the process was named. Ambrotypes were more affordable than daguerreotypes.	The tintype process was actually an early form of instant photography. The images could be made quickly and cheaply, and the process was very popular until the 1930s, although stereo tintypes were less common.

	Albumen print	**Gelatin silver negative and print**	**Autochrome**
Introduction:	1850	1871	1907
Inventor:	Louis-Désiré Blanquart-Évrard	Richard Leach Maddox	Louis and Auguste Lumière
Alternative names:	-	Gelatin dry plate (for negative)	-
Common use:	1850–1900	1878–1940	1907–1935
Process type:	Positive	Negative and positive	Direct positive
Surface layer:	Paper or glass	Glass (negative and positive) Paper (positive)	Glass
Characteristics:	The brown toned albumen prints provided a high resolution and were capable of reproducing the fine details that were captured on an albumen or collodion negative.	Gelatin silver negative plates retained their sensitivity for months and could be developed long after exposure in camera. It combined the benefits of both collodion negatives and albumen negatives, without their disadvantages. Gelatin silver was also used to print positive images on glass, and later also on celluloid, for viewing with a stereoscope.	Autochrome was based on the principles of additive colour. By mixing three light sources with the primary colours red, green and blue, any other colour could be created. Autochrome plates were covered in microscopic red, green and blue-coloured potato starch grains. The layer of coloured starch grains acted as a colour filter on a monochrome glass plate negative. When a photograph was made, light passed through the colour filter before it reached the sensitive emulsion. After development, a colour image appeared.
History:	Albumen print was the first widely applied process for printing images on paper or glass. It became the leading printing process of the 19th century.	Gelatin silver positives on glass were popular from 1890 to c. 1930.	Autochrome was the first practical and commercially applied colour photography process in history.

Notes and references

1. Pellerin, D. (2021) *Stereoscopy: The Dawn of 3D*, pp. 59-62.
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Website: stereoscopyhistory.net