

Moving Image and Sound: Basic Issues and Training: Ann Harris

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Lumicolor: The Lumière Autochrome Color Process on Film

The term Lumicolor can refer to both the celluloid based, color reversal format for still photography released by the Lumière Brothers in 1932 as well as the 35mm, motion picture format they developed in the mid-to-late 1930's. Lumicolor was based on the Lumière Brothers' highly successful color mosaic photographic process, the Autochrome which used glass plates as the base for the photographic emulsion and color dyed particles. The Lumière Brothers patented the Autochrome in 1903 (in France, 1904 in the United States) and after they released the format publicly in 1907, it emerged as the standard for color photography around the world for over three decades¹. Lumicolor represents the final stage of creating the Autochrome color process on a flexible film base for still photography and motion picture film.

English language accounts of the Lumières' development of Lumicolor can be found mostly in short articles, essays and historical summaries. No comprehensive biography of Auguste or Louis Lumière or of their work after the Cinematograph appears to have been written in English². Overall, when the Lumière Brothers are written about in length the accounts focus on the Cinematograph, the Autochrome or the many films they or the Lumière Company produced. Lumicolor or their development of color motion picture is generally an afterthought, if mentioned at all. The excellent website *Autochromes Lumière*³ produced by the French Minister of Culture and Communication notes that many historical documents relating to the Lumières appear to have been lost or destroyed. So many accounts needed to be reconstructed from incomplete or indirect sources. So why Lumicolor did not emerge as a standard motion picture format is difficult to find a definitive account of. However, it

1 *Colour Photography, The First Hundred Years 1840-1940*, Coe, Brian (1978), London: Ash & Grant, pp. 52-53.

2 There is a biography of Louis Lumière written by Georges Sadoul in 1964, titled *Louis Lumière* but I could find no English translation of it. Auguste Lumière wrote a memoir published in 1952, but there also is no English translation. There are two English language books which are juvenile non-fiction, but they focus on early cinema and the Lumière Brothers leading up to the Cinematograph: Jim Whiting's *Auguste and Louis Lumiere: And the Rise of Motion Pictures* in 2006 and a publication from the Lumière Institute released in 1995 with an English translation by Steve Parker entitled as *Science Discoveries: The Lumiere Brothers and the Cinema*. The excellent 1995 book *Letters* released by Faber and Faber, 1995 contains a lot of excellent translated primary source information and notes from the editor and translator, but it is not a comprehensive historical account.

3 "Documentary Sources" section, *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=465&L=1>

seems that a combination of the timing of its development right before World War II, competition from other highly successful color formats and visible issues inherent within the Autochrome mosaic color process itself prevented Lumicolor from becoming a viable color motion picture film format.

One important thing to note when talking about the Lumière Brothers is that although they equally credited themselves for all of their work, Louis Lumière was the primary driver for nearly all of their moving image based innovations and photographic work after 1900. In his 1974 essay "The Lumière Brothers" in the volume *Lumière - The First Color Photographs*, André Barret described their difference as Auguste being the biologist and Louis being the physicist⁴. Auguste began to focus primarily on medical research in 1896 and eventually opened the Clinique Lumière in Lyon while staying involved in the management of the Lumière Company.⁵ When it came to the finalizing the Autochrome process and the development of Lumicolor and its precedents, Louis Lumière took the lead. Auguste was always a consultant regarding their great cinematic and photographic achievements - and often was the subject in front of the camera. Louis was the cinematographer of their films and was the persistent driving force with all the stages of their color photographic developments.

Getting the Autochrome color process onto celluloid film strips had two main technological hurdles: first, the expose time was too long; and second, the color mosaic 'grains' filters naturally tended to group together on the film emulsion. Minimizing both these issues were critical for the color format to be reduced to 35mm, exposed at 24 frames a second and projected. The 'grains' of color creating a mosaic of 'natural' color was unique to the Autochrome color process, but the issue of creating faster exposures was always on the mind of the Lumière Brothers since they first worked in their father's photo studio 1880 and 1881 respectively.

Their father, Antoine Lumière was a painter-turned portrait photographer who established a successful photography studio in Lyon, France in 1871. Auguste began working at his father's studio just after graduating high school and Louis joined his brother in his last year of high school. He

4 André, Barret in his essay "The Lumière Brothers" in *Lumière - The First Color Photographs*, pp 8-9 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

5 "Auguste, the Humanist," *Autochromes Lumière* website: <http://www.autochromes.culture.fr/index.php?id=158&L=1>

immediately began experimenting with photographic dry plates and the newly discovered silver bromide gel. Speed in exposure time and simplifying the developing of snapshots was of paramount concern to Antoine as he marketed Ferrotypes photographs for walk-in clients for one franc per portrait⁶. A Belgian photographer, Monckhoven developed plates which circulated through Europe. In 1881, Louis Lumière perfected a stable dry plate process based on these plates which had a much faster exposure time than anything on the market. In 1882, this became known as the Etiquette Bleue or "Blue Label" plate which became mass produced in the new Lumière and Sons factory in the Monplaisir district of Lyon. By 1889 a 1500 plates were being made a day and by 1896 3000 plates and 3 kilometers of photographic paper were produced in the factory⁷. This product, which would be produced into the mid-twentieth century, and its financial success gave the Lumière Brothers the time and financial ability to develop experiment and create their subsequent color photographic work.

They admired the photographic discoveries of Gabriel Lippmann and collaborated with him create color plates based on Lippmann's "interferential" color theory (for which Lippmann won a nobel prize in 1908). The interferential color process involved putting color dyes of the visible light spectrum on thin glass plates which, when light was transmitted through each color layer, each acted upon adjacent layers as light reflected back through a glass plate base using a mercury based reflector⁸. Lippmann's initial color photographic experiments needed over an hour exposure time to render an image, but yielded impressive full color images. Louis Lumière reduced the exposure time in half and eventually to a few minutes over time, but abandoned the process when an exposure time under a few minutes could not be achieved⁹.

The Lumière's began then working with Louis Ducos du Hauron's trichrome color theory in 1893 which used three separate exposures of red, green and blue images and combined them back together on a glass plate (du Hauron's "indirect" color theory was announced in 1869 simultaneously as the French poet Charles Cross, but could not be accomplished until more color sensitive emulsions

6 Paul Génard, "Autochromes in the History of Photography" - *The First Color Photographs*, p. 23 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

7 "Serial Production of the Étiquette bleue Plates" - *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=63&L=1>

8 "Lippmann" section, *Timeline of Historical Colors* website - <http://zauberklang.ch/filmcolors/timeline-entry/1335/#/>

9 *Letters, Auguste and Louis Lumière*, Jacques Rittaud-Hutinet, 1995, p. 5 n

were developed). The resulting photographs from the trichrome process were impressive color photographs, but the process needed extreme precision to avoid color fringing of the layers and exposure time was still too long for the Lumière Brothers due to the need to shoot three separate images for each color layer¹⁰.

In the summer of 1894, the first Edison Kinetoscope parlor opened in Paris. Antoine Lumière was invited to a demonstration of the device showing moving images through a peephole. He returned to Lyon encouraging his sons to develop a better way to display moving photographs¹¹. After a failed idea of Auguste's to create a moving image projection device based off of cylinders, Louis Lumière dreamed up a mechanism using the same process of a sewing machine¹². This ultimately would lead to the Cinematograph and launch the Lumière's Brothers into the cinema history pantheon. After nearly a thousand films were created using the Cinematograph, once their camera/printer/projector was franchised out to Lumière Company trained operators around Europe and the United States, they sold the Cinematograph patent to the Pathé Company in 1902. They began to focus on other pursuits and once again turned to color photographic experiments where they left off.

Their work with creating Lippmann's interferential plates demonstrated how layers of color filters on an sensitive photographic layer can create a full color image. Their trichromatic photos based on du Huron's theory demonstrated how additive color could be created from red, green and blue images shot consecutively and superimposed together. Each of these color experiments also clearly demonstrated how color filtration will greatly diminished exposure times. The mosaic filter process the Lumière Brothers developed for the Autochrome had far from instant exposure times. But it did not need the preparation of multiple color layers and it only involved exposing and developing one photographic plate, not multiple plates.

The Lumière Brothers eventually managed to reduce the exposure time of the Autochrome to seconds rather than minutes with a unique and innovative process developed after a long period of experimentation. The Institut Lumière points out on their Autochrome webpage that:

10 Paul Génard, "Autochromes in the History of Photography" - *The First Color Photographs*, p. 25 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

11 *Early Cinema* website - http://earlycinema.com/pioneers/lumiere_bio.html

12 "Founding Father, Louis Lumière in Conversation with George Sandoul", Edited and Translated by Pierre Hodgson-
http://asu.edu/courses/fms502mr/total-readings/Sadoul_Louis%20Lumiere%20Interview.pdf

"[w]hilst only a few months separated the Cinématograph patent and its mass production [in 1895], Louis Lumière required no less than 4 years of trials, attempts and successive refinements to move from his 1903 patent for 'obtaining color photographs' into marketing the first color photographic plates in 1907."¹³.

A microscopic view of a given area in any Autochrome photo will reveal red-orange, green and blue-violet color 'grain'¹⁴. These are microscopic 'grains' of dyed potato starch. Pulverized potato starch acted as a transparent filter on the panchromatic photographic emulsion when exposed to light. To get the microscopic filters, the Lumières:

"pulverized transparent potato starch, passed it through a sieve to isolate grains between ten and fifteen thousands of a millimeter... they were mixed and evenly spread over a glass plate coated with a sticky varnish. An extremely fine powder of charcoal dust was spread over the plate to fill in any gaps in the color grains, This coating was carefully flattened under a high pressure rolling process, thereby producing a tricolored mosaic screen. On every square inch of that screen there were about four million individual microscopic screens of red-orange, green, and violet."¹⁵

To compensate for the strength of the blue light of daylight, a yellow filter was also placed on the lens. When photographing an Autochrome, the plate needed to be base side out so the dyed transparent 'grains' would act as a filter on the silver bromide emulsion. After developing and fixing the glass plate needed to be projected or seen in a special box, such as a diascope. Extremely high quality photographs are the result, but the randomized clumping of color, which may not have been the intention of the Lumière Brothers, gives the Autochrome a special character which could be likened to many styles of painting happening in France and elsewhere at the time. The resultant image, as the Lumière Institut writes on its Autochrome website "does not truly mirror reality, rather it represents its interpretation in pastel hues enhanced by the transparency of the support"¹⁶.

The Lumière Brothers worked on the principle that "natural" color can be formed in our brain when red, green and blue are juxtaposed together. This is the principle behind the Pointillism, the specific

13 "Lumière Autochromes" section Institut Lumière website - <http://www.institut-lumiere.org/english/lumiere/autochrome.html>

14 The colors of the dyes in described in the Lumière Brothers' U.S. Patent No.822,532, filed 1904, Published 1906 patent were fairly broad. They described that the potato starch grains as "transparent in orange, green, and violet, or else in red, yellow, and blue, or even in 25 any number of colors" But they did ultimately settle on red-orange, green and blue-violet. -

<https://www.google.com/patents/US822532?dq=822,532&hl=en&sa=X&ei=xuuHUsb4le7nsATog4LIAw&ved=0CEcQ6AEwAg>

15 John Wood, *The Art Of The Autochrome : The Birth Of Color Photography*, 1947 - University of Iowa Press, 1993, p. 4

16 "Lumières Autochromes" - Institut Lumière website - <http://www.institut-lumiere.org/english/lumiere/autochrome.html>

technique of Impressionist painting made famous by Georges Seurat in 1886. The 'points' of color painted in groups to create the desired when viewed as a whole image - color is "mixed" in our mind rather than the canvas. Looking at an Autochrome photograph, can easily make one think of Seurat's landscape's or portraits. John Wood in his 1947 book "The Art of the Autochrome" describes that the fact that the Autochrome process being similar to Pointillism is more of an "accident" than anything else. The microscopic 'grains' of color filters making up the Autochrome are not actually visible to the naked eye. But when grouping three colors next to each other, the similar colors would sit next to each other appear grouped together. The filters themselves became visible clusters or points of color and acted like Pointillism by chance¹⁷.

The complex production process produced a photograph which could be used by amateurs (an enthusiast interested in more than just snapshots) and inspired artists and professional photographers. It was the first successful color process which lasted on the market from 1907 through the mid-1930's. By 1914, 6000 plates were being produced per day at the factory at Monplaisir¹⁸. Autochromes ended up all over the world as many National Geographic photographers used them, Albert Kahn chose the Autochrome as part of his Archives of the Planet and still functioning Autochromes were discovered in 1960 from an Antarctic expedition from 1911¹⁹.

Since the first experiments with Autochromes Louis Lumière increased the amount of starch 'grains' from 3000 per square millimeter to 9000 per millimeter in 1907. This was done by using a machine he invented to crush the 15 to 20 thousands of a millimeter starch grains further still²⁰. The proper exposure time for an Autochrome photograph was one second at f-stop f/8 in the midday sun. Without direct sunlight, exposure took several seconds. Tripods were needed to get a sharp picture²¹. Also, while the glass plate base fit the standard for cameras when it was first released, flexible film backs and smaller film sizes would become popular in cameras of the 1920s.

The factory in Monplaisir stopped production due to lack of materials in 1914 due to the World

17 John Wood, *The Art Of The Autochrome : The Birth Of Color Photography*, 1947 - University of Iowa Press, 1993, p. 5

18 "Golden Age of the Autochrome" section - Autochromes Lumière website- <http://www.autochromes.culture.fr/index.php?id=476&L=1>

19 *Letters, Auguste and Louis Lumière*, Jacque Rittaud-Hutinet, 1995, Appendix 2: The Autochromes, p. 306

20 *Letters, Auguste and Louis Lumière, Ibid*

21 Paul Génard, "Autochromes in the History of Photography" - *The First Color Photographs*, p. 32 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

War. They only produced images up during World War I when the French army needed black and white photographs for military purposes. Color plate competition started in 1916 as Agfacolor released a color screen plate in Germany with nearly the same color process as the Autochrome. It was a mosaic color process which used gum in alcohol solutions dyed red green and blue instead of potato starch. It became available on the market in England in 1923²². In the late 20's, Louis Lumière started to work on an Autochrome version with a flexible backing, rather than the glass plate which would eventually become a new product launched in 1931 called Filmcolor.

Filmcolor took the Autochrome format to cellulose nitrate for the first time. Transferring the process off of glass plates did slow down exposure times, however. Luis Marden in his photography enthusiast paperback, *Color Photography with the Miniature Camera* from 1934 describes that "while the Société Lumière recommends an exposure of one second at f/8. The writer finds that an exposure of three seconds at f/8 is much nearer correct" when shooting with small format Filmcolor²³. He also mentions that when projecting Filmcolor still images, "a five-hundred watt lamp is ideal."²⁴ as opposed to the two-hundred normally used. The Autochromes Lumière website notes that "a glass enclosure was recommended for projection" for Lumicolor and for Ultra-Fast Lumicolor which was developed in the late 1930s to help with "subjects in motion or shadow."²⁵ In the June 1936 *International Photographer*, the American distributor for the Lumière Company, RJ Fitzsimmons advertised that Ultra-Fast Lumicolor was five-times faster than Filmcolor, with a suggested exposure time of 1/5 a second at f/4.5 in bright sunlight using the same process as the Autochrome.

While Louis Lumière worked on speeding up exposure, he was also tackling the issue of creating a small format film which could be put on rolls of film (unlike Filmcolor which needed a flat back to support the film). Paul Génard writes about the difficulty Louis Lumière ran into when trying to take the Autochrome process to smaller and smaller formats. The smaller the format, the larger the mosaic color grains appeared when projected. In the "Improvements" section of Génard's essay about

22 "Agfacolor Screen Plate" section, *Timeline of Historical Colors* website - <http://zauberklang.ch/filmcolors/timeline-entry/1337/>

23 Luis Marden, "Lumière Filmcolor and Lumicolor" section of *Color Photography with the Miniature Camera*, p. 30. Marden talks about using Filmcolor as a 35mm format in 1933 (his preface is dated March 1934). I can't find any reference to Filmcolor or Lumicolor still film being available on 35mm - especially as early as 1933. Perhaps he was using the 45mm x 107mm format or perhaps other sources are incorrect - maybe there was a 35mm version of Filmcolor.

24 Luis Marden, *Ibid*, p. 39

25 "Rise and Fall" section, *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=115&L=1>

Autochromes, he writes of the difficulty of this discovery:

"Louis Lumière was astonished, for he had chosen a caliber of grains that should have rendered them invisible; by examining them under a microscope, he discovered it was not actually the grains one could see, but agglomerations of pigments of the same color. He was running up against an attraction phenomenon due to static electricity, whatever the method of stirring the mixture. He could not prevent agglomeration, but he could further diminish the size of grains. He decided to use yeast instead of potato starch, and opened new avenues for the procedure: the small format and the cinema."²⁶

Gérard describes it as 'agglomeration' due to 'static electricity'. John Wood described the issue was just a probability factor that one in three colors would sit next to the same color and it was impossible to spread all the microscopic grains evenly. Whatever the issue, Louis Lumière switched the formula from potato starch to yeast particles. The resulting process produced Lumicolor which was released as a still format on rolls of film in 1933 in Europe and 1934 in the United States. As a still format, it was market as Ultra-Fast Lumicolor. No longer was a yellow filter needed over the lens - there was a yellow filter on the filmstrip itself which dissolved upon development²⁷. It was twelve times faster than Lumicolor and it allowed Louis Lumière at least the possibility of creating color motion picture film on 35mm.

Many color motion picture formats were developed since the Lumière Brothers made the last films in the late 1890s. But in the mid-1930s, three major color formats which would become film industry standards emerged. In 1932, Technicolor IV was developed as a 3 color strip, dye-transfer subtractive process and in 1934 it was used for shorts in the Hollywood system and the first feature *Becky Sharp* was released in 1935. That same year a color reversal process, Kodachrome, was launched by Kodak in the United States for 16mm film use. And in Germany, Agfacolor Nue a reversal process based on subtractive color was released for 35mm. So Lumicolor was entering the market with some severe competition.

1935 was the fortieth anniversary of the demonstration of the Lumière Cinematograph. Local

²⁶ Paul Génard, "Autochromes in the History of Photography" - *The First Color Photographs*, p. 32 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

²⁷ Luis Marden, "Lumière Filmcolor and Lumicolor" section of *Color Photography with the Miniature Camera*, p. 30. (Marden writes of a description of Lumicolor told to him at the time by RJ Fitzsimmons as Lumicolor was not available in the US when he wrote the essay).

and state officials in France wanted to mark the occasion and what eventually becomes known as the Lumière Jubilee was planned. At the time, Louis Lumière was demonstrating some anaglyph three-dimensional motion picture experiments at the French Academy of Sciences²⁸. He agreed to the Lumière Jubilee as a celebration of film as long as a separate occasion would be held for Auguste regarding medical developments. This appears not to have happened²⁹. An article in Time about the Lumière Jubilee mentions how three-dimensional films were shown at the Sorbonne in Paris and how the viewers had to wear plastic glasses³⁰ - this same article mentions that Auguste Lumière is dead because he did not attend the Jubilee. Louis Lumière considered these three-dimensional films, the last ones he made in his last interview with George Sadoul in 1948³¹ and they toured around Europe.

But these would not be the last films attributed to the Lumière Brothers. Several short films were made using Lumicolor. The venue for showing some of these moving image color experiments was a booth at the 1937 Paris Exposition. In the summer of 1937, the last pretense of peace between the great continental European powers was shown at the 1937 Paris Exposition. There would be a large pavilion for the the USSR and one for Nazi Germany on either side of the Eifel Tower. Sandwiched in between them and underneath the Tower were pavilions for other European countries including the host country France.

Paul Gérard describes two of the "several" of the Lumicolor motion picture films which were held at the archives of the Museum of Cinema in Lyon (in 1974). He lists two documentaries "one of the World's Fair in Paris" (presumably this is the 1937 Exposition), and the other Lumicolor documentary was of "the centenary of the Arch du Triumphant. In this last document filmed on the Champs-Élysées, the perspective of the military uniforms presents a shimmering of colors or extraordinary charm and brilliance.³²" He does not mention the only Lumicolor short I have seen transferred to video, *Jeunes Filles Prenant Le Thé* or *Tea Time* which is a DVD extra on the 2006 Flicker Alley release *Discovering Cinema*.

28 "The Magician of the Image" section, *Autochromes Lumière* - <http://www.autochromes.culture.fr/index.php?id=162&L=1#glossaire1>

29 *Letters, Auguste and Louis Lumière*, Jacque Rittaud-Hutinet, 1995, Introduction, p. xxiv

30 "Lumière Jubilee", *Time*, 11/18/1935, p 21

31 "Founding Father, Louis Lumière in Conversation with George Sadoul", Edited and Translated by Pierre Hodgson, p. 9 - http://asu.edu/courses/fms502mr/total-readings/Sadoul_Louis%20Lumiere%20Interview.pdf

32 Paul Gérard, "Autochromes in the History of Photography" - *The First Color Photographs*, p. 32-33 of English translation by Joyce Longworth, University of Delaware (see Annotated Bibliography below for detailed information about this source).

Tea Time is a well-photographed and edited short of three women in a park, rowing in a boat on a lake, feeding a swan, having tea in the park and generally fussing about with make-up (there is a classic swan versus pet-dog confrontation as well). The direction is not all that great with some of the actor's hesitation showing, but as a whole it is a rather complex film compared to early Lumière films. The color is very nice, but it does seem a bit dark - particularly when the action takes place in the shadows and not direct sunlight. There are some very soft focus moments, but there is no blurring of movement or streaking of any kind.

What stands out the most is the 'grain' of the film itself. It does appear to be a print of an original - there are some white hairs and specs normally associated with subtractive color and negatives. But since Filmcolor was introduced, copying by contact printing was possible. Luis Marden has a section called "reproduction of Filmcolor by contact" on page 40 of *Color Photography with the Miniature Camera*. Making prints would be critical to the success of a motion picture format.

Assuming Louis Lumière would not use a different filmstock for printing his Lumicolor originals, making a mosaic color print onto a filmstock made up of mosaic color components would absolutely compound the problem with the starch 'grain' clustering together. There is no documentation readily available about if or how prints were made. But in the final analysis of Lumicolor from 1937 on film, it looks like it has high contrast in the blacks, not very much latitude with lighting not directly in the sun and it is very, very 'grainy'. These issues could very well have been approved upon, but it seems unlikely that Lumicolor could compete commercially with Kodachrome, Agfacolor or Technicolor. I think it certainly could have found a niche market of enthusiasts due to its Autochrome color hues and organic quality.

By the end of World War II, Auguste and Louis Lumière were over 80 years old. Louis Lumière was beginning to be pursued by academics to talk about the early Lumière films as his own. Georges Sandoul included him in a history of cinema and even got the chance to interview him on television in 1948. This was his last interview as he died a few months later. Auguste lived until 1954 and wrote a memoir of his life, *Mes Travaux et mes Jours (My Work and My Days)* in 1952. The Lumière company continued as it was run by August's son Henri and Louis Lumière's son-in-laws, Jean-Michel Lefrancq

and Albert Trarieux³³.

In 1952, the last color process released by the Lumière Company called Alticolor was released. It was an even faster version of Lumicolor building on progress which Louis Lumiere left off before World War II. Unfortunately, it was never developed for 35mm film³⁴. This was at a time when Kodachrome was being produced on 35mm as slide and motion picture film and Agfacolor was already making slide 35mm film.

The Autochromes Lumière website indicates, the last additive color process films shipped from the Montplaisir factory in 1955³⁵. The Lumière Company continued to make photosensitive material for years after Ilford bought a major share in the company. But the process of making color films at the Lumière Company stopped seven years after Louis Lumière passed away and just a year after Auguste died.

33 "The Lumière Company (1928-1982)" section - *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=137&L=1>

34 "Rise and Fall" section, *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=21&L=1>

35 "The Decline of the Autochrome " section *Autochromes Lumière* website - <http://www.autochromes.culture.fr/index.php?id=114&L=1>

Annotated Bibliography

Books

Letters

Auguste and Louis Lumière, 1862-1954 - Faber and Faber, 1995

- A wonderful collection of letters to and from Auguste and Louis Lumière among others. The notes from the editor, Jaques Rittaud-Hutinet and the translator are incredibly helpful in connecting who is who and the annotating references within the letters. (There is not all that much material about Autochromes, Filmcolor or Lumicolor in the volume, however).

Lumière: The First Color Photographs, Paul Génard and André Barret (University of Delaware translation, typed manuscript - translate by Joyce Longworth)

- This volume contains two excellent essays by Paul Génard and André Barret and was edited by the latter. Each essay describes a narrative of the first Lumière Brothers work in black and white photography through autochromes and in the case of Paul Génard, all the way through Lumicolor films.
 - I received this book as an inter-library loan (it is mis-cataloged as having Auguste Lumière as as the author) and there is a title "Treasures of Photography" attributed to André Barrett - this may be the original title of this volume. There were no attributions to any sources aside from the photocopied images of Autochromes in this typewriter original manuscript translation held by the University of Delaware library.

The Art Of The Autochrome: The Birth Of Color Photography, Wood, John, 1947 - University of Iowa Press, 1993

- Contains wonderful reproductions of Autochrome photographs from a Lumière still life in 1905 to Joseph Stiglitz prints in the 1910s through anonymous photos in the later 1920s. While most of the text reads like art criticism of early photography, there is an excellent description of the Autochrome process. It also was the book that the cinematographer of the 2006 film, *The Illusionist*, used when seeking to imitate the style of the Autochrome³⁶.

Color Photography with the Miniature Camera, Marden, Luis, The Fomo Publishing Company, 1934.

- Great mix of enthusiast magazine writing and instruction for the Filmcolor process - a very unique document in English of a users experience with the Lumière Filmcolor process. Available in New York Public Library for in-use use only. Marden does mention that Lumicolor is not available yet in United States in his preface dated March 1934.
 - He also talks about using Filmcolor as a 35mm format for the article. I can't find any reference to Filmcolor still film being available on 35mm - especially as early as 1933. Perhaps he was using the 45mm x 107mm format or perhaps other sources are incorrect - maybe there was a 35mm version of Filmcolor.

³⁶ American Cinematographer, "Conjuring the Past", Patricia Thomson, September 2006, p. 53

Websites

"Timeline of Historical Film Colors" - <http://zauberklang.ch/filmcolors/timeline-entry/1336/#/>

- This site has the only image of a Lumicolor strip of film I could find - from the Cinémathèque Française (This is four frames appears to be from "Tea Time" or "Jeunes Filles Prenant Le Thè" which is featured on the Discovering Cinema DVD (see below). It was very helpful for giving timing and context to the development of color film related to Autochrome and mosaic color. The citing of Brian Coe's *Colour Photography, The First Hundred Years 1840-1940* (1978) was very helpful because the only copy I had access to was an offsite request at the NYPL. The Lumière color film process is referred to as Autochrome Film / Cinécolor (there is no reference to Lumicolor on the site).
 - There is a mistake in the Autochrome Film / Cinécolor section. She attributes several stills to a German book, *Bericht über den VIII. Internationalen kongress für wissenschaftliche und angewandte photographie*. There is a copy stored off-site, which I was able to see at the Schwartzman building of the NYPL. But there are no color photographs in the entire book, especially not related to Mosaic color.

Institut Lumière - <http://www.institut-lumiere.org/english/frames.html>

- The Institut Lumière's Autochrome's page has a great short history of the birth of the Autochrome through the development of Filmcolor, Lumicolor and the Lumicolor format for the 1937 Exposition. It also has wonderful Autochrome images, Photorama, as well as images of the Lumières.

Autochrome Lumière - <http://www.autochromes.culture.fr/index.php?id=1&L=1>

- A fantastic resource for Autochrome history and technological description with excellent videos illustrating the actual process of creating autochromes (with the narration in French). It is a great resource for the history of the Lumière Company and family. This site also has a great short description of the Filmcolor, Lumicolor, and Alticolor process history:
<http://www.autochromes.culture.fr/index.php?id=42&L=1>

Luminous Lint, Connoisseurs of Fine Photography - <http://www.luminous-lint.com/laW/public/5/1/2/9/0/20/T/>

- Great resource for Autochrome photos, micro-photographs and of August and Louis Lumière.

ŠechtI & Voseček - "Auguste & Louis Lumière" - <http://sechtl-vosecek.ucw.cz/en/expozice10/tabule-lumiere.html>

- Good resource for Autochromes, especially from Mark Jacobs collection

The Photographs I Find - "Alticolor, the Autochrome of the 1950s" - <http://silversolvent.blogspot.com/2009/11/alticolor-autochrome-of-1950s.html>

- Found great Alticolor packaging pics here

Concept Lab - Sketches in Photostereosynthesis

<http://www.conceptlab.com/photostereosynthesis/sketches/wigglestereoscopy/>

- Fantastic reconstruction of Louis Lumiere experiments with Photostereosynthesis and 3D in the 1920s.

Paris 37 - Worker and Collective Farm blog - <http://www.liveinternet.ru/users/myparis/post116063587> - [in Russian]

- Incredible Russian blog devoted to 1937 Paris Exposition. Amazing images.

Scott's Photographica Collection

<http://www.vintagephoto.tv/autochromebox.shtml>

- Discovered a great 1935 advertisement for Filmcolor and Lumicolor

Newspapers

The International Photographer, "A New Lumière Filmcolor", June 1936, Walter P. Batts, R.J. Fitzsimmons, 75 Fifth Avenue, New York City

- Essentially the piece is an advertisement by the US sales representative of the Lumière Company. But it is very technically detailed and was helpful in placing the time of Filmcolor entering the market.

Video

Discovering Cinema [DVD] (Movies Dream in Color: Additive Color Process), Lange, Eric, Flicker Alley, 2007

- The disc entitled *Movies Dream in Color* devotes a fair amount of time on the Lumicolor film process and has an entire Lumicolor short as a DVD extra. The short is called "Jeunes Filles Prenant Le Thé" and translated as "Tea Time" on the disc. This is the only moving image of Lumicolor I was able to find and it does show off the Autochrome color and 'graininess' of the 35mm, motion picture version of Lumicolor very well.