BOOK OF ABSTRACTS

2nd Edition of Colour Photography and Film: sharing knowledge of analysis, preservation, conservation, migration of analogue and digital materials

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SESSION 1 – September 15th 2022, 9:30 am -11:10 am

The Interferential Color Plate aka Lippmann Plate: Materiality, Identification, and Conservation challenges of Lippmann Plates

Jens Gold

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Preus Museum – National Museum of Photography – Horten, Norway

The interferential color process also known as Lippmann color is one of the most unique examples of early color photograph technology. Today only a few institutions and collectors worldwide have original examples of these rare color images in their possession. Preus Museum, the National Museum of Photography in Norway, has a collection of twelve Lippmann color plates together with objects, papers and historic books related to these photographs. Because of the very special properties in terms of the technique itself, its presentation form, and its requirements for viewing, there is a clear need for additional awareness about this medium in the field of both photo history and photograph conservation. The purpose of this paper is to provide information about the collection at the Preus Museum, the principle of the color interference technique, the physical and optical properties of the interferential color plates. The paper will also discuss typical damages, deterioration issues, and challenges with these types of objects, both in exhibitions and in terms of long-term preservation.

Projecting Color: The Lippmann Plate in the German Empire circa 1900

Hanin Hannouch

Weltmuseum, Wien, Austria

My research examines interferential color photography, a medium first disclosed by Gabriel Lippmann (1845-1921) in 1891 at the Parisian Academy of Sciences. Specifically, my work addresses Lippmann's reception in the German Empire by doctor of medicine and anthropologist Richard Neuhauss (1855-1915) and by physicist Hans Lehmann (1875-1917). It focuses on their use of projection of inferential plates (both mono and stereo) circa 1900, studying the double feedback loop between color photographs and the projector. This feedback loop should be understood as a privileged relationship between the image and the instrument, one that included both the dissemination of the sensual experience and the knowledge of color to the public as well as the rationalization of the projection device.

Finlay, Thames, Dufay and Paget color screen collections: Using Digital registration of viewing screens to reveal original color

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2 United States (in memoriam)

3 American Museum of Natural History, United States

We discuss digitization and subsequent digital analysis and processing of negatives (and diapositives) made by Finlay, Thames, Dufay, and Paget additive color processes. These early color processes were introduced in the early 1900s and remained popular until the 1950s. Such methods involved taking photographs using panchromatic black and white glass plate negatives through a special color screen filter (screen) with a fine regular pattern of red, green and blue patches. After developing the negative, a black and white diapositive was obtained by contact copying. Once registered with a viewing screen, the image turns to color.

While these processes were less popular than Autochrome, they were used by several important photographers because of their speed and possibility of reproduction. Examples actually show high quality and enhanced depth of color.

In 2013, Jan Hubička and Mark Jacobs identified Finlay color negatives in the Matson (G. Eric and Edith) Photograph Collection digitized by the Library of Congress. Most of these photographs were taken during a trip to Africa in 1936. More recently additional Paget color negatives were identified by Kendra Meyer. These were taken by Yvette Borup Andrews during the first and second Asiatic Zoological Expeditions, between 1916 and 1919, and had been digitized in black and white by the American Museum of Natural History (AMNH) in 2017.

We will discuss challenges these negatives pose to digitization. The imaging exceeds the demands of normal black and white negative digitization in terms of resolution, dynamic range, calibration, and geometrical precision. We will also demonstrate a special-purpose software developed to produce high-quality color renderings. This process involves multiple challenges including compensating geometry errors, determining realistic color models and more. We also discuss the possibility of digital recovery of colors of aged color slides using an infrared capture (which eliminates the viewing screen) and adding back a digital screen.

It is more than likely that there are more undiscovered early color examples using these processes in international archival collections. Until recently, the AMNH had not recognized the significance of Andrews's Paget plate negative collection because at first sight they appear to be traditional black and white glass plate negatives: by contrast, viewing them in color is remarkable. Using the identified collections, we will discuss the relevance of this technology to analog and hybrid photographic archive collections. The ramifications of revealing the original color of these images are immense for historians, researchers and archival collections managers. The use of modern technological applications to fully discover hidden elements and value of historic analog collections material is an argument for smaller, project-centered digitization programming in institutions in order to recognize unique material.

Autochromes from the Bombelli Collection: History and Conservation Survey on an Early Color Photographic Process

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The Istituto Centrale per il Catalogo e la Documentazione (ICCD) is the Italian leading institution dedicated to photography. In 1895 Giovanni Gargiolli founded Gabinetto Fotografico Nazionale (GFN) to document the Italian cultural heritage for the purposes of cataloging and protection. The Archive counts more than 220.000 black and white negatives in different formats, historical and modern positives, corresponding to most of the negatives, 35.000 color photographs and 25.000 digital prints. The entire body of records has been originated and increased by photographic campaigns dedicated to the Italian cultural heritage, it is the result of its own production and the acquisition of archives and collections that belonged to photographers and collectors.

Within the color photographic materials at the ICCD the presence of autochromes is remarkable. The present work shows the result of a recent project that has been carried out at ICCD and has been focused on the preservation and restoration of Autochromes belonging to the Bombelli Collection.

The Bombelli Collection was acquired to GFN in 1971 by the director Carlo Bertelli. The collection of about 20.000 photographs, dating from 1915 to 1950, offers a glimpse into the rarely seen public and private art collections, a fascinating picture of the art market in the North of Italy between the two wars. Photographic subjects are mainly historical, artistic, pictorial from the 1800s and early 1900s.

Among other photographic processes the Bombelli Collection is composed of 2030 autochromes in different formats, mainly on glass plate and rarely on film, protected and sealed with black paper tape. Overall, the plates are in good condition. However, oxidation and silver mirror have been detected, as well as widespread presence of mold. Small point-like spots appear often in correspondence with deposits of dirt; yellowing and sulfuration, up to color shift sometimes occur on the image layer. Glass plates show signs of degradation, such as abrasions, scratches and in some cases cracks and breaks; films are often affected by curves.

The conservation project has achieved the stabilization of the materials through cleaning and consolidation treatments, as well as the re-housing of the entire section, currently located in the climate-controlled storage of the ICCD. Moreover, a conservation survey has been carried out shading light on several degradation patterns.

This work will explain the study and analysis of the state of conservation and will give a description of different effects visible on the photographic objects with the attribution to possible causes of deterioration. Preservation methods and housing solutions will be also illustrated along with choices and decisions made during the intervention of restoration and the obtained results

SESSION 2 – September 15th 2022, 11:30 am -1:15 pm

Autarchic colours: preserving Gustavo Petronio's "Autarcolor" and the chromatic self-government of the Italian animated cinema of the late 1930s

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Our presentation is part of a research and preservation project focused on the nitrate film collection of the Italian illustrator and animator Gustavo Petronio, dating back to the 1930s and held by University of Udine.
In addition to his work as an illustrator and cartoonist, Petronio played a pioneering role in the Italian animation cinema along the 1930s. During the second half of the decade, he designed and produced several animated drawings films, including a series of short advertising and feature films. On 17 February 1939, he patented the Autarcolor, a coloring device and system based on the bi-chromatic imbibition technique, already used in photography since 1901, which he applied to a series of commercials (1938-1941). Autarcolor (patent number 370.680) should be considered as a pioneering event for the national context, despite having little diffusion due to the introduction of the Agfacolor chromogenic film in 1942 on the Italian market, which made such process obsolete.
Starting from the original film materials (negative and colored positive prints) and several not yet considered primary sources (patents, subjects, scripts, storyboards, and correspondence), on the one hand we will seek to investigate and reconstruct the historical and cultural framework of the experimental chromatic practices of the Autarcolor, and, on the other hand, we will aim to apply a diagnostic-documentary framework to realize a first digital documentation and remediation attempt of the Petronio's patented coloring system.

Chemistry and colorimetry: preliminary investigation on chromogenic motion picture film

Beatrice Sarti[1], Alice Plutino[1], Margherita Longoni[1], Alessandro Rizzi[1] and Silvia Bruni[1]

1 University of Milan, Italy

Color fading due to the degradation of the dyes is the main concern regarding the conservation and restoration of photographic and cinematographic materials. The intervention on the physical support is most of the time unsatisfactory and insufficient for restoration, which makes the digital conversion and digital restoration the only means to recover the film content. However, missing the non-degraded version of the support, the restoration is still dependent on the subjectivity of the operators that perform the work, even being experts. In this context, colorimetric studies are necessary in order to formulate hypotheses on the real evolution of the degradation process of the dyes as a function of time, with the purpose of obtaining information

about the original appearance in respect to the analog materials. Different materials mean indeed different gamuts that lead to different colorimetric coordinates.

The existence of a wide number of different films makes the conservation and restoration process very challenging. Indeed, in the photographic and cinematographic history, not only several supports (cellulose nitrate, cellulose triacetate and polyester) have been used, but also many techniques of coloration or color development (from early cinema to chromogenic motion films) have been employed, as well as many emulsions, dyes and couplers. In this scenario, knowing the material that composes the physical part of the film object could help the experts in all their work, from conservation to restoration.

Unfortunately, the leading production companies have always been reluctant to divulge the compositions of the used compound due to the competitive logic that has always governed the film industry. Moreover, with the decline of the film market, the technical datasheets of films are harder and harder to find. This scenario is even worsened by the fact that a very limited number of studies have been reported on the identification of coloring substances of film materials.

In this work, we want first to make the reader aware of the difficulties and problems we have encountered on this topic, highlighting the importance of scientific research on this cultural object that would otherwise be lost. Finally, we want to show the preliminary results that make Raman spectroscopy, and especially SERS SERS (Surface-Enhanced Raman Spectroscopy), a promising method to individuate the dyes of motion picture films, revealing a new potential application of this technique in the field of conservation science.

The colors of the butterfly wings: non-invasive microanalytical studies of hand coloring materials in 19th-century daguerreotypes

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2 Opificio delle Pietre Dure — Ministry of Culture (OPD), Italy

In the 19th-century, the daguerreotypes were compared to butterfly wings because of their fragility, iridescence, precision, and color. Since the early years of the daguerreotype era, there was a particular interest in colored images, a characteristic that the contemporaries expected from the newly available photographic images. To solve this inconvenience, painters and photographers took advantage of the experience of miniaturists and hand colored the Daguerreian images. As early as 1840, painted layers application to daguerreotypes became common, several manuals were published [1], and a new market of ready-to-use materials was developed [2]. Historical records – rich in technical information – offer an insight into the painting materials and their diverse methods of application exploited by daguerreotypists and colorists. The most common way was to apply pigments bound with gum arabic, using stencils to delimitate the area to hand color.

Despite the consistent amount of published literature regarding the history, the physical and chemical properties of the daguerreotype plates, and their conservation, little is known about the practice of hand-coloring, particularly from the analytical point of view [3], [4]. Identifying pigments and dyes plays an important role in the conservation of daguerreotypes, since some, mainly lake pigments, are prone to photodegradation, and their presence may have an impact on the outcome of the cleaning procedures, for example, when laser cleaning is involved [5]. Very few studies report on daguerreotype painting materials characterization with a multianalytical approach. In fact, Golovlev et al. [6] deduced the presence of Prussian blue ($Fe_4[Fe(CN)_6]_3$), iron oxide (Fe_2O_3), and barium white ($BaSO_4$), based only on the elemental LIBS results. Kozachuk et al. [4] found Cochineal lake in the flesh tones using SEM-EDS, FTIR, and SERS spectroscopies, the latter enabled by the intrinsic nanostructure of the daguerreotype plate.

In this work, we report on the results obtained with non-invasive techniques, such as X-ray Fluorescence (XRF) and micro Raman spectroscopies, on several 19th-century hand-colored daguerreotypes from the Fondazione Alinari per la Fotografia (FAF). Our goal was to identify the painting materials and compare our findings with the available literature.

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[3] S. H. Ferguson, The Daguerreian Annual, 13–18, 2008.

[4] M. S. Kozachuk, et al., Applied Spectroscopy, 72, (8), 1215–1224, 2018.

[5] I. Turovets, M. Maggen, and A. Lewis, Studies in Conservation, 43 (2), 89–100, 1998.

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Inkjet print with a width of 186 cm

Markus Paul Müller

Recom ART GmbH & Co. KG, Germany

A wish comes true. Since inkjet printing has established itself in the art market, there has always been one crucial shortcoming: 164 cm print width and not 182 cm as with chromogenic prints. A joint project with Ilford, DP Solution and recom ART has made this wish come true. As already introduced last year, the inkjet can also replace the chromogenic color print even in the case of artworks laminated on the front behind acrylic glass, thereby enabling greater durability.

A Mimaki printer was filled with Epson P20000 inks and Ilford cut the Gold Fiber Gloss paper to a width of 186 cm. The width of 186 cm is crucial, since older works of art on chromogenic prints were also produced earlier in this width. Thus, a replacement without loss of width is also possible.

In another project with Canson, new questions about inkjet paper for large-format photography are to be answered. The comparison with the chromogenic print in terms of effect, surface gloss

and others should also be done in order to match the paper to the model of the chromogenic print.

The lecture will explain the challenge up to the finished workflow. The advantages of inkjet paper in the context of durability should also be briefly explained.

authenticity.art

Markus Paul Müller[1] and Youngji Bae[2]

1 Recom ART GmbH & Co. KG, Germany

2 Seoul Recom Art, South Korea

Since the invention of photography production methods and their interpretation by photographers have constantly changed. In the midst of this fluid process there also have been created and are being created, principles of production techniques and individual Œuvres. We have entered an age in which information is key. When confronting fleeting and fragmented data, the question of how to store and manage data streams appears as of immense importance. To allow for a precise understanding of how a photograph was created and potentially can be restored or even reproduced, there is a profound need for a lucid, safe and dynamical documentation of any information serving the preservation of the authenticity of the artwork. What is the title? When did production take place? How was it assembled or is it to be displayed?

authenticity.art allows producers, institutions, artists and collectors to save all relevant informations about an artwork securely in a blockchain. The system simply relies on an NFC Sticker and an app.

Let's imagine an inconspicuous sticker placed somewhere on an artwork. You take your mobile phone or tablet, scan the code and within an instant all you need to know is right there in front of you. On the occasion of an artwork being damaged, this data will provide you with the instructions to restore or even reproduce the artwork. Access to the data is only granted to the owner of the artwork. The data is protected against misuse and changes by unauthorized parties.

In our presentation we will focus on the structure of the proposed system, build upon the emergence of NFC, NFT and Blockchain, rather than the specific content intended to be preserved through the system. We intend to highlight practicability, accessibility and scope of the authenticity.art model.

authenticity.art is a collaboration between TapIt Inc. and recom ART and is to be transferred to a foundation in the near future.

Oil photography: A color photographic technique, with no discoloration, unique to Japan in the 19th century

Akiyoshi Tani

Historiographical Institute, The University of Tokyo, Japan

In the second half of the 19th Century in Japan, oil photography, which is a unique color photographic technique with no discoloration, was invented by combining oil painting and photography techniques and traditional East Asian binding techniques. In this report, Japan's unique photographic technique of oil photography is outlined.

Oil photography created on paper applied traditional Japanese binding techniques that were skillfully employed in different ways to suit several kinds of Japanese paper with differing characteristics. This was detailed by the photographer Azukizawa Ryoichi who applied for a patent in 1885. A detailed statement of techniques of the patent related to paper oil photography methods is as follows:

① After purifying the glass plate with alcohol, water-spread the paper. The paper is thin and transparent like ganpi paper, which is a Japanese paper made from Diplomorpha sikokiana of Thymelaeaceae. It is luster and half-transparent due to its thin and short fibers. The paper is water-spread onto the glass with a solution of distilled water mixed with a small amount of ginger juice.

② With water-wax paste (a paste made by using heat to melt a wax secreted by larvae that live as parasites on privets, solidify the wax in cold water) wrapped in a silk cloth, rub the paper stuck onto the glass. In addition, rub the surface of the photograph or lithograph with the water-wax paste. Thereafter, water-spread the surface of the photograph or lithograph onto the thin and transparent separating paper, which is a piece of paper inserted in between to prevent the articles from rubbing against each other, that was stuck onto the glass previously.

③ After it has dried, rub off the paper of the underside, exposing just the thin membrane of the image. Then, apply over the latter with a solution of turpentine oil and a little castor oil. Leave it for five days.

④ After wiping away the oil with a cloth, use oil paints to color the thin membrane of the image from the underside. After coloring, stick on tengujo paper, which is a durable and extremely thin Japanese paper that has thick, long fibers (It comprises paper mulberry [Broussonetia kazinoki × papyrifera] as a raw material). After the paint has dried, apply the varnish.

⑤ Using torinoko, which is a type of Japanese paper and mainly a thick ganpi paper, or another type of paper or a cotton cloth, perform the backing process. After it has dried, peel it off from the glass to complete the work.

In essence, paper oil photography is a very rare photographic technique in which Western and Eastern techniques are employed together. The aim is to view and preserve a color photograph by inserting the albumen print image layer colored from the underside with oil paints between several pieces of Japanese paper that have different characteristics. Accordingly, the detailed

techniques and knowledge of traditional Japanese artisans who skillfully handle Japanese paper are employed.

Painting or Photograph? - Study of Avant-Garde photographer Noboru Ueki (1905-1992)

Yoko Shiraiwa[1], Takako Yamaguchi[2], Masahiko Tsukada[3] and Takayasu Kijima[3]

1 Shiraiwa Conservation Studio, Japan

2 Tokyo Photographic Art Museum, Japan

3 Tokyo University of the Arts, Japan

Many of us are familiar with hand coloured albumen prints which were popular during Meiji Period (second half of19th Century) in Japan. Japanese photographers, since then have explored different processes which involved applying inks or colours on photographic prints. Before the appearance of colour photography, there were handful of Japanese photographers experimenting with colours although many of them did not produce substantial body of works. Among them, Noboru Ueki (1905-1992) can be considered an exception, who was active during the divergent era of Japanese photography. In 1930s, he was skillful in making “Zokingake” a unique “wiping off” process in Japan that some of Japanese photographers practiced. After the war, he started to apply colours to gelatin silver prints and around 25 works of this type are known to exist, most of them at Tokyo Photographic Museum. There are over 100 works by him at the Museum.

Here we will report our research on his painted photographic works in historical and technical aspect. Until now there has been no research done on the painting medium and his technique. Besides, little has been studied on painted photographs made during mid 20th Century. Our aim is to conduct scientific analysis which can lead to investigate the medium, what was his technique in applying colours to prints, what type of degradation can be seen, and how stable the works will be in the future when considering the appropriate environment for these works. These information can lead to understanding more deeply his intention as well as his expression and what has driven him to create these works. We have just begun the research and we hope to explore his painted photographs to unravel the diversity and richness of photography in Japan during this period.

SESSION 3 – September 15th 2022, 2:30 pm – 6:00 pm

Photographic Films on Chemically Unstable Plastic Supports: Identification, Care & Optimal Practices for Lebanon & The Middle East

Rachel Tabet

Arab Image Foundation, Lebanon

Films on chemically unstable plastic supports are a common problem within the field of photographic conservation worldwide. The inherent instability of the cellulose acetate and cellulose nitrate film bases is common for both color and black and white films. Practitioners working in Lebanon, a multiple risk zone, have specific circumstances to consider and obstacles to overcome. This presentation provides an actionable plan for deteriorating photographic films that is specifically relevant to the needs, obstacles, and limitations within the Middle East region. Existing literature was applied and evaluated by conducting a survey to investigate photographic film collections housed within the Arab Image Foundation in Beirut. Through quantitative methodologies, and using scientific tools, data was gathered to determine the types of film bases available, and the overall condition of the collections. Actively deteriorating samples were used to devise a plan for cold storage using locally sourced materials and equipment wherever possible. The results showed that the majority of the films are actively deteriorating, putting into question the damaging effect of current storage conditions and the critical need to implement cold storage on a large scale.

Cold storage of face- and back-mounted photographs: investigation of the effect on the material compound.

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Six face-mounted samples (120 x 160 cm) and one pre-damaged original artwork (120 x 120 cm) were exposed to alternating temperature conditions. Cold storage was set at 8 °C with a fluctuating relative humidity in a cooling chamber, while room temperature storage occurred at 19 to 27 °C depending on the prevailing climate conditions. However, the temperature remained stable within 24 hours with only minor fluctuations. The samples were alternatingly exposed to these two setups in a 24-hour rotation over five weeks to assess the effect of strong and rapid climate fluctuations on the stability of the composite materials. Daily examination of the samples involved checking the surface temperature and measuring expansion behavior of the acrylic glass and aluminum back sheet. Taking into account the material-specific thermal conductivity, it was estimated how the temperature spreads within the composite in order to understand prevailing stress conditions. Under the extreme and therefore stress-intensive testing conditions, irreversible deformation occurred. Further significant changes became

manifest in localized color-change that can be interpreted as a loss of translucency between the acrylic glass and the photograph, due either to loss of adhesion or possibly chemical degradation within the photographic emulsion. In addition, incipient delamination was observed on the pre-damaged original artwork. Exceeding the dew point temperature, which was unavoidable, resulted in condensation on the acrylic glass surface and led to extensive streaks and, in combination with the electrostatic charge, to extreme dust deposits. Overall, our findings underline the importance of a stable climate for the storage of face- and back-mounted photographs. Suchlike strong changes in temperature and relative humidity should be avoided or at least must be implemented in a slow, controlled manner. Therefore, cold storage cannot be recommended for these kind of material compounds.

Hand-Colouring Photographs: a Study on Reproductions of Islamic Art around 1910

Franziska Lampe

Zentralinstitut für Kunstgeschichte Munich, Germany

The image archive of Bruckmann (founded in 1858) has preserved the visual material of one of the largest publishing and art printing companies in Germany in the early 20th century. The holdings, comprising approx. 150,000 photographs of reproductions of art-works, are spanning from around 1860 to the 1990s. Bruckmann published scientific works on archaeology and art history, such as Heinrich Wölfflin's "Kunstgeschichtliche Grundbe-griffe" or the illustrated magazine "Die Kunst für Alle". A large business was also the pro-duction of collection and exhibition catalogs. In competition with Hanfstaengl, Adolphe Braun or Alinari, Bruckmann distributed photographic reproductions as well as single sheets in Germany. Through their retouching and annotations, the archival documents distinguish themselves as particularly unique photographic objects. After World War II the archive was considered destroyed, but only recently, for the first time, it is available for research at the Zentralinstitut for Art History in Munich. My proposal aims to present a first hand look at this post-doctoral research project with a focus on coloured reproductions.

The first major project on non-European art at Bruckmanns was an extensive photo and catalog campaign on the „Exhibition of Muhammadan Masterpieces in Munich 1910“. The exhibition, curated by Friedrich Sarre and Frederik Martin, brought together some 3,600 Islamic art objects from international collections in this unique project. Bruckmann was entrusted with the task of taking 400 photographs of selected art objects – photographers and colourists were allowed to work directly on the exhibition grounds in Munich. 15 of the objects were reproduced as colour plates. This was based on an elaborate hand-colouring process, of which the original photographs provide evidence today and for the first time. They have all been preserved in the historical archive. On the basis of this corpus, I am investigating how and according to which criteria the photographs were coloured and how the process actually proceeded in the translation to the printed image. Many hands were involved in the process, and there were constantly revisions of the colour versions. For a long time, these images, reproduced in many publications, were the only photographs of these specific art work; they were groundbreaking as visual footage for Islamic art history.

For this investigation, beside the technical aspects, also the historical discourse on colour is a guiding basis, as it proves to be an extremely complex process, especially within the context of art reproduction. In this regard colour touches not only on perceptibility, but is also closely connected with aesthetic, epistemic, ethical, mercantile, and (power-) politi-cal questions and problems. How can we make the "knowledge of images" speak and what methods can we use to look behind their stories in order to deconstruct established narratives (on non-European art)?

Jewish Blues and the Color Revolutions in Auto Da Fé (2016)

Sabine Doran

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What the “color revolutions”—as they have unfolded in the new millennium in streets and squares and on the World Wide Web, from the Orange Revolution in the Ukraine to the Yellow Revolution in China—have in common is that they are bloodless revolutions and therefore decidedly not colored in the red that marked earlier left- or right-wing revolutionary politics. However, what is striking in the millennials’ return to forms of civil resistance symbolized through colors of flowers, clothes, ribbons, and flags, is the organizational role that chromatic algorithms play in orchestrating the dissemination of a specific coloring (charged with songs, slogans) on the streets and on social media platforms, where “flower power” figuratively blossoms seemingly spontaneously and globally in cross-fertilizations, which I propose to explore in the photographic and filmic installations of the Ghanaian-British media artist John Akomfrah. For the urgency with which the color revolutions rise is reflected in Akomfrah’s multi-channel installations, in which photographic archives of the Black Atlantic return in a dialogue between analog and digital media, between black and white and color photography, which are drawn into a faux-sepia dimension of tableaux vivants that animate the uniforms and costumes of colonial times. In the diptych Auto Da Fé (2016), a response to the modern refugee crisis, Akomfrah’s performance of the potential of a color revolution begins with the arrival of Sephardic Jews of African descent on the island of Barbados in 1654, fleeing their persecution during the Inquisition in Brazil. Their expertise in technologies of dyeing (indigo) and refinement (sugar) and its impact on the island’s modern history (as a hub of trade and migration) animates the “Jewish Blues,” as I will call it, of a color revolution, which Akomfrah updates into an uprising against the migration politics of our time. In tonalities of blues Akomfrah animates the shift from gestures of reading (the Torah) to rising fists, which interrupt the blueness of the sea that absorbs the black and white photographs of siblings washed ashore alongside of colorful luggage, suggestive of those who drowned on their escape from political and religious persecution. In this paper, I will thus explore Akomfrah’s performance of a color revolution in Auto Da Fé as the uprising of a “Jewish Blues” at the cross-section of technologies of dyeing (clothes, photographs) and their potential to transfigure seeing into a form sea-ing the world – through the eyes of the dead and the drowned.

The conservation of "Icarus", 1984, Unique Cibachrome print, by Boydd Webb.

Adia Adamopoulou

Freelance conservator, Greece

Boyd Webb was born in New Zealand in 1947 and works in the United Kingdom, mainly using the medium of photography although he has also produced sculpture and film. He was shortlisted for the Turner Prize in 1988.

His artwork “Icarus” is a direct positive, a unique Cibachrome print, also known as Ilfochrome. Cibachrome is a dye destruction positive-to-positive photographic process used for the reproduction of film transparencies on photographic paper. The prints are made on a dimensionally stable polyester base as opposed to traditional paper base. Whereas a black-and-white print requires paper with one layer of emulsion—a light sensitive coating—a silver dye-bleach print (or dye destruction print) such as a Cibachrome print is made on paper containing three emulsion layers, each sensitized to one of the three primary colors of light—red, blue, or green. During development the silver and extra color dyes are selectively bleached away to achieve the desired final colors. Silver dye-bleach prints are noted for their clarity, color purity, and being an archival process able to produce critical accuracy to the original transparency.

This artwork took part in an exhibition at an Athenian gallery in 2021 and presented some peculiar conservation issues, caused by its way of mounting. The photographic paper, which measures 76x102cm is nailed on a sheet of a white painted plywood. The nails penetrate the 4 corners of the photographic paper through metallic hoops, which have been integrated in the paper. The plywood is placed in a wooden black frame with glass and wooden spacer respectively. The external dimensions of the frame are 112x152cm.

Due to the way the photograph is “hanged”, the photographic paper is not flat, presenting tensions and curling. Tears have formed in the upper right and lower right perforated corners, which indicates that the frame was stored leaning on the left side for a long time.

As the exhibition curators noticed that the artwork was in danger to fall inside the frame, they were led to seek for immediate conservation assistance.

This case study will present the conservation strategy that was implemented for this unique print, in respect to the one of a kind mounting and framing. Materials and techniques will be explained as well.

UltraStable II Color Carbon Emulsion Flakes: A New Era for an Old Process

Charles Berger[1] and Tod Gangler[2]

1 UltraStableColor, United States

2 ArtSoulPhoto.Inc, United States

More than 150 years after it was used to make the first color photograph on paper, the pigmented gelatin process known as “color carbon” continues to produce hand-made color

photographs of matchless beauty and permanence. Color carbon prints made for renown artists and photographers such as James Turrell and Sarah Moon are exhibited at top-tier galleries including Gagosian and MacGill, and most recently, were featured in the ParisPhoto exhibition. At the same time, renewed interest in historic ("alt") photo processes has brought an increased awareness and appreciation of the unique features of the hand-made, exhibition-quality, color carbon print. However, as the last commercially available color carbon print films were manufactured by Charles Berger's UltraStable Color Systems in 1996, the lack of materials has limited the use of the process to those few printmakers capable of making their own color print films from scratch. Until now.

The new UltraStable II Emulsion Flakes, developed by Tod Gangler in cooperation with Charles Berger, using the original UltraStable formulations, contain all the ingredients to make CMYK carbon films - pigment, gelatin, and non-toxic sensitizer. Users can simply add water to the flakes, coat and go on to produce the finest color carbon (pigmented gelatin) prints ever made.

Long-term stability testing of the prints, including both accelerated light stability and Arrhenius dark stability tests, are currently underway at Wilhelm Imaging Research, Inc. Previous tests with the pigment set conducted in 1993 received a WIR Display Rating in excess of 500 years (Henry Wilhelm and Carol Brower, The Permanence and Care of Color Photographs, Table 3, pp. 135-136).

Designed to produce accurate, high quality, long-lasting color carbon pigment prints, the emulsion flakes also provide opportunities for artistic intervention in the creation of photographic images that the "experimental" uses of commercial sensitized materials (e.g., Lumigrams and Chemigrams) cannot. By coating multiple, light-sensitive pigmented gelatin emulsions in one layer, it becomes possible to create a multi-color carbon pigment print with a single exposure. Importantly, the unique gestural movements used to apply these multi-color emulsions are retained and intertwined with the embedded photograph. As such, the chance-inflected "PolyColor" print is in direct opposition to the predictable results of digital photography and the rigid discipline of the historic carbon process.

These new color carbon pigment emulsion flakes, in the hands of contemporary photographers, artists and printmakers, will renew and revitalize fine art photographic printmaking world-wide. There is little doubt that when the history of color photography in the 21st century is written, the 19th century color carbon process will play a featured role.

KEYNOTE - HENRY WILHELM

A 145-Year History of the Stability and Preservation of Color Photographs and Film – The Overlapping Roles of Manufacturers, Photographers, Collecting Institutions, and the Consumer Marketplace – From 1877 to 2022

SESSION 4 – September 16th 2022, 9:10 am – 10:45 am

A case study of the rapid yellowing of an inkjet print by Tracey Emin

Jordan Megyery

Tate Gallery, United Kingdom

I am currently Conservator of Contemporary Art at Tate where I specialise in the conservation of analogue and digital photographic materials. Tate has a collection of over 6,000 photographs, over 1,000 of which can be categorised as 'digital' prints. The term 'digital print' can denote a range of printing technologies including inkjet, electrophotographic and laser prints and within these technologies there are innumerable combinations of printers, inks and substrates that create a final printed image; this leads to huge disparity in stability levels across different 'digital' prints and can make identification very difficult.

An inkjet print by Tracey Emin, The Last Thing I Said to You was Don't Leave Me Here II (2000) developed bright yellow discolouration around the white borders of the print during an international touring loan. The literature points to two possible causes of this yellowing; the microporous ink receptor layer present on some inkjet papers readily absorbs atmospheric pollutants into the coating layer which can lead to discolouration; the degradation of optical brightening agents after exposure to UV light has also been identified as a cause for yellow staining in inkjet papers. The specific cause of the rapid onset of yellowing in the Tracey Emin print is being investigated by the paper and photograph conservation department at Tate to prevent the yellowing of other inkjet prints from occurring in the future.

The following methods will be used to investigate the most likely cause of yellowing in the print; a review of the literature, conversations with experts in the field, investigation into the material composition of the print, and comparison with a sister print held by The National Portrait Gallery. The following factors will be discussed as potential causes for yellowing in the print; light, mounting and framing materials, atmospheric pollutants, materials within the paper support itself i.e. optical brightening agents, and a combination of these factors. Tate's approach to the Emin print moving forward will be discussed, including treatment options, the potential reprinting of the artwork and the measures put in place to prevent damage to similar artworks in the future. The difficulty, and necessity, in correctly identifying inkjet print materials to facilitate their appropriate care will also be highlighted.

A spectral approach to digitally restore a faded Agfacolor print from 1945

Sreya Chatterjee[1], Giorgio Trumpy[2] and Ulrich Rüdel[1]

1 University of Applied Sciences, Berlin, Germany

2 Norwegian University of Science and Technology, Norway

The fading of the image dyes of chromogenic photographic and film materials produced between 1940s and 1980s, due to their photochemical and thermodynamic instability, is of grave concern in the field of preservation of image collections, and it endangers a substantial proportion of audiovisual heritage.

While chemical measures remain inadequate to treat this irreversible form of deterioration, the use of digital image processing techniques to retrieve residual color information and digitally reconstruct a supposed original color appearance have been pursued over the last decades. Previous research laid the essential foundation by taking into consideration the complications due to the side absorptions of image dyes, conducting accelerated fading tests and verifying the linear bleach model. These previous methods, however, did not consider the actual spectral densities of the dyes to (I) quantitatively determine the contribution of each dye in the formation of the R, G and B digital images and (II) to recreate the original spectral properties of the film in order to reproduce the supposed color aesthetics of the film before fading.

We propose a complete spectral approach to digitally reconstruct the faded colors of chromogenic materials by combining principles of color science and image processing techniques. This material-based approach extracts the residual color information with a dedicated imaging system that uses narrow spectral bands to capture high bit depth images. Thereafter, a digital image processing method, called "dye purification", calculates the ‘dye contamination’ in each digital image due to the side absorptions and computes the images corresponding to the single cyan, magenta, and yellow dyes. The concentration values of the faded dyes are then increased selectively to derive the supposed original absorbance properties of the film, thus spectrally characterizing the deviation caused by the fading and reconstructing the historical colors.

To test this approach, a case study was conducted on an Agfacolor print from 1945. This unique element, a 35 mm combined positive on a cellulose acetate base, was a projection print of the "Panorama No. 4". This cultural film of the Third Reich was filmed using the newly introduced Agfacolor negative-positive process, which was a breakthrough in the chromogenic film chemistry due to its diffusion-resistant dye components. However, the chemical instability led to severe fading over time of the yellow and cyan dyes, which manifests today as a strong magenta coloration.

Thorough bibliographical research on the evolution of the chemical composition of Agfacolor led to the determination of spectral densities of the dyes used in Agfacolor positives in 1944. This finding was pivotal to reconstruct—to the best of our knowledge—the original color aesthetics of the film through the dye purification process.

A method to predict the light stability of colour prints displayed under LED light with different spectral irradiance

Rita Hofmann-Sievert

Applied University of Bern, Switzerland

In the past, light fastness studies were performed under standardized light sources which were typical for indoor lighting environments for example window filtered daylight, fluorescent and halogen light. A breadth of data exist on historical colour materials in the literature. Modern non-blackbody light sources offer superior energy efficiency and widely replace standard light sources in homes, commercial locations and cultural heritage institutions. Human centric lighting may vary with the time of day or personal taste or actinic lighting maybe be fine-tune to enhance a particular object. Each of these lighting conditions has its particular relative spectral irradiance. Thus a museum has a range of options for choosing the best lighting, or relative spectral irradiances (RSI) in an exhibition.

The first criteria for choosing the lighting should be the compromise of best colour reproduction while causing a minimum of degradation. LED lighting is said to be benign because most LED white lights do not emit UV. Unfortunately, there is often a strong blue emission present, which may cause strong degradation in imaging materials. The measurement of illuminance as was done in the past is no longer suitable to characterise the degradation potential of LED lighting. A recently published standard, ISO/TS 18950:2021(E), Imaging materials — Photographic prints — Effect of light sources on degradation under museum conditions, requires the measurement of relative spectral irradiance and total irradiance.

Our experimental work was done to understand degradation of colour prints under different types of LED lighting. Printed colorants were exposed to narrow band LEDs in the range of 385nm -620 nm. Such narrow band LED do not heat the sample much and a rather small chamber could be built with only moderate cooling and conditioning requirements. All fading experiments were done at 25 °C and 45-55% relative humidity.

The individual fading curves for every colorant in each wavelength band allowed to determine the sensitivity of colorants to specific wavelength bands. In addition, predictions could be made as to the fading of those colorants under white light LED of different RSI.

Knowing the sensitivity of imaging materials to specific wavelength bands can help to select the best filters to protect a print or a light source with an RSI that causes a minimum of degradation when a print is on display. It may also help to design better imaging materials.

The colour photography in the Vincenzo Balocchi's photographic archive

Tiziana Serena

University of Florence, Italy

This paper is based on the analysis of the photographic archives of Vincenzo Balocchi (1892-1975). It is a work in progress of knowledge and valorization, promoted by the Region of

Tuscany with the collaboration of the Alinari Foundation that preserves his archives, of which we present the first results.

Although he is considered one of the protagonists of Italian modernism, a Florentine photographer affiliated with the Milanese group "La Bussola" (1947), his work has not yet been studied in depth. Moreover, the complexity of the materials in the archives raises a series of questions. Among these, the case of color photography emerges as an interesting and not marginal aspect in his production, especially between the 1950s and the 1960s.

In fact, there are numerous color positives, many of which have been exhibited in national and international shows. The possibility of analyzing them together with the 4,550 negatives and 354 color slides makes possible to outline a first study on the color work of Vincenzo Balocchi. Furthermore, this paper proposes itself as a working hypothesis on the topic of color photography in Italy after World War II, on which historiography has not yet produced extensive studies.

SESSION 5 – September 16th 2022, 11:30 am – 1:00 pm

Case study of pace by Nino Migliori: the executive technique of an experimental artwork of contemporary color photography

Maria Cristina D'Amico[1], Melissa Gianferrari[1] and Andrea Del Bianco[1]

1 Bologna Academy of Fine Arts - School of Restoration, Italy

The aim of this presentation is to illustrate the work devoted to the identification of the constituent materials and the study of the execution technique of Pace by Nino Migliori, a complex artwork of experimental contemporary photography made by the renowned Italian photographer in 1973, which is part of the MAMbo – Bologna Museum of Modern Art's permanent collection. In particular, the present work intends to focus on the study and research phase which preceded the conservation treatment performed on Pace, given the particular nature of the artwork in which the photographic materials and the media of contemporary art coexist in a unique and complex interaction. Hence, an in-depth study of its execution technique, structure and components was deemed necessary in order to plan and perform an adequate conservation treatment.

ChromaLuxe and New Generation Helios Sublimation Inks - Applications for Long Term Display of Photographic Images

Leland Carlblom[1], Paul Neumann[2], Davide Dragoni[3] and Stephanie Roberts[2]

1 R&D Coatings, LLC, United States

2 Universal Woods, LLC, United States

3 JK Group S.p.A. Italy

Dye sublimation printing is a technology that dates back to the late 1950s in France. The first large scale use of this technique came in the 1960s and 1970s and utilized ribbon transfer. In the 1990s digital sublimation printing became widely used for fabrics. Since digital sublimation printing utilizes disperse dye colorants, the surface to be printed must be permeable to the dyes when subjected to heat and pressure. Coatings on hard surfaces can make them receptive to the necessary dye infusion. Early hard surface objects decorated by dye sublimation included products such as cups, coasters and name badges. In 2006 Universal Woods began development of coated metal substrates suitable for dye sublimation printing of photographic images. The product, tradename ChromaLuxe, has since undergone several generations of continuous improvement through extensive research to understand interactions among components of the coating, the inks, and the individual dyes in the inks. Since dyes do not typically exhibit long term light permanence, extensive research into stabilization technology was also necessary. This information, in conjunction with a partnership with Kiian Digital, a major global sublimation ink supplier, has identified coatings with optimized light permanence for use in ChromaLuxe metal panels as well as a new generation of hard surface sublimation ink (Helios)

which addresses the permanence shortcomings of standard hard surface sublimation inks. Ongoing Independent light permanence testing of this substrate/ink combination at Wilhelm Imaging Research is projecting results comparable to existing long life products. These results and the inherent superior physical durability of the metal substrate make this combination a viable candidate for long term display of photographic images. This discussion will further detail these developments.

On the identification of colour photographic processes

Ambra Cattaneo[1], Alice Plutino[1], Beatrice Sarti[1] and Alessandro Rizzi[1]

1 University of Milan, Italy

Photographs conservation is a discipline developed quite recently. Just thinking that the rules of the International Organization for Standardization (ISO) were only drafted around the 2000s. Because of this, it is often difficult to find the information needed to have a complete frame of knowledge about process identification.

Therefore, the aim of this study is to study a protocol, based on the state of the art, for identifying the most common colour photographic processes of the XX Century.

The protocol is made of four steps: I. Print observation: a preliminary visual examination of the front and the back of the print; II. Surface observation: a visual examination of the surface using the proper light angle of incidence; III. Magnified observation: a visual examination with microscope; IV. Decay and damage: the analysis of the alteration and degradation.

The Print observation involves the visual examination of the support, the image colour and tone, the format, the border and the back of the print. The Surface observation is carried out illuminating the surface with a perpendicular light to evaluate the sheen, or with an angle of 45° to evaluate the texture. The Magnified observation is realized using magnifying glasses and portable microscopes and it is useful to define the image and layer structures. Finally, the state of conservation is evaluated by the analysis of degradation, making a distinction between mechanical, biological or physio-chemical processes. The location, the extension, the nature of the process and an evaluation of the state of conservation are the goal of this phase.

After the description of the methodology we have tested its applicability. A set of photographs has been analyzed. The collection, consisting of seventy photographs dating from the mid-1960s to the 2000s, is relatively diversified in terms of materials and formats. Furthermore, the photographs come from different archives with uncontrolled level of conservation, which is the reason they exhibit forms of degradation typical of inappropriate manipulation, exposure and conservation, such as scratches, surface abrasions, fading and shading.

KEYNOTE NICOLA MAZZANTI

“THE STUFF THAT DREAMS ARE MADE OF.” – COLOR AND CINEMA BETWEEN CREATION AND RESTORATION FROM ANALOG TO DIGITAL. A (SOMEWHAT) PERSONAL STORY.

SESSION 6 – September 16th 2022, 2:30 pm – 4:10 pm

Maxwell's Disappointment / Sutton's Accident

Susanne Klein[1], Paul Elter[2] and Abigail Trujillo Vazquez[3]

1 UWE Bristol, Centre for Print Research, United Kingdom

2 Elter Studios, Canada

3 UWE Bristol, Center for Print Research Maxwell's Disappointment / Sutton's Accident United Kingdom

It has almost become somewhat of an urban legend or internet myth that James Clerk Maxwell created the first colour image and had demonstrated this at the Royal Institution in London in May 1861. He did present something, but what? In 'The scientific papers of James Clerk Maxwell' the experiment and resulting colour projection was regarded as a failure and barely mentioned. Thomas Sutton, a well-established and respected photographer, was tasked with carrying out Maxwell's thought-experiment using the latest photographic processes. Sutton, himself author of various books on photography, does not mention the experiment in any of his publications. Move forward to the 1930's and enter the photo-chemist Douglas Arthur Spencer, who gained access to the original lantern slides and made copies of the three colour separations. He made the first and only physical print of the 1861 tartan ribbon and it is this colour print that we now see everywhere as Maxwell's first colour photograph. In 1961, the 100th anniversary, Ralph M Evans published a paper in Scientific American trying to solve the riddle of the famous tartan ribbon. The original glass plate photographs were made using the wet-collodion process which has a very narrow spectral sensitivity centred in the blue light wavelength. Sutton could not have recorded in the green and red part of the spectrum. Evans deduced from an experiment with modern materials that Sutton had possibly recorded the ultraviolet reflection present in the red of the tartan ribbon and "accidentally" presenting itself as the red slide and the resulting image can be considered a 'false colour' image. Now, 160 years since that first experiment, we are exploring and executing some of the material and technical truths about wet-plate collodion and what might have actually been recorded and why is it that both Maxwell and Sutton regarded the experiment such a failure, but the rest of the world did not.

Contributions to the characterization of chromogenic dyes in colour slides

Joana Silva[1], César Laia[1], António Jorge Parola[1], Maria da Conceição Oliveira[2], Bertrand Lavédrine[3] and Ana Ramos[1]

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2 Instituto Superior Técnico - Universidade de Lisboa, Portugal

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Chromogenic reversal films or colour slides are first-generation positive transparencies. These were widely used in photojournalism, fine arts, for commercial applications such as advertising, fashion, industry, and in academia. During the 1960s, artists were gradually getting interested in audio-visual supports as new media of expression and colour slides were no exception.

Chromogenic materials are vulnerable to degradation, having poor long-term stability. These dyes are highly susceptible to oxidation and hydrolysis, both induced by light (light fading) and/or relative humidity (RH) and temperature (T) (dark fading). Continuous contact with environmental agents disrupts the chromophore molecules, leading to the formation of colourless degradation products. Since the different dyes present in a product have different molecular structures, these materials are prone to shift the original colour balance. Residual colour couplers are also vulnerable to oxidation, producing yellow stain.

The susceptibility of a specific colour slide is dependent on the chemical nature of the materials composing the object. To study this type of materials, reference samples are usually induced to artificial ageing. However, chromogenic reversal film are industrial products, which have been progressively upgraded and discontinued. For that reason, it is now difficult to find a product equivalent to the one used in the past. Thus, unless the initial condition of the artwork was documented, there is no way to estimate how a specific chromogenic artwork has changed, making difficult to predict how it will degrade in the future.

From this premise and focused on case studies from the Portuguese artist Ângelo de Sousa (1938-2011), a research study was carried out seeking the characterization of chromogenic dyes. Based on the isolation of the different dyes composing a chromogenic material, several procedures were tested to describe the dyes found in chromogenic reversal films, such as Thin-layer Chromatography (TLC), High-Performance Liquid Chromatography with Diode Array Detector (HPLC-DAD) and linked to Mass Spectrometry (HPLC-MS), as well as Infrared and Raman Spectroscopies.

Additionally, this research aimed at developing a methodology to accurately describe and monitor both dye fading and shift in colour balance. To do so, chromogenic reversal films were artificially aged at different T (50, 60, 70 and 80˚C) and RH (40% and 60%). UV-vis spectrophotometry with optical probes, a non-destructive technique, was used to analyse the samples upon ageing. By using optical fibre probes, reduced areas of the image were analysed, which was considered a valuable contribution for the analysis of 35 mm films. From the spectral data, intensity maximums, CIE L*a*b* coordinates and the total colour variation (ΔE*) have been determined. Optical microscopy and digitization were also used as tools to assist the assessment of colour change in the artificially aged samples.

Definite identifiers of silver dye bleach prints

Suk Fong Chun[1], Rita Hofmann-Sievert[2] and Sanneke Stigter[1]

1 University of Amsterdam, The Netherlands

2 University of the Arts Bern, Institut for Materiality in Arts and Culture, Switzerland

Silver dye bleach prints are difficult to differentiate from another type of silver halide colour prints: chromogenic prints. This study aims to determine the underlying cause of this difficulty and to find practical methods to identify silver dye bleach prints. The rationale is that silver dye bleach prints have fewer variants than chromogenic prints; if the former can be unambiguously identified, then differentiation can be achieved automatically. The first task in achieving this aim is to understand the material properties of silver dye bleach prints. The second is to evaluate known identifiers (identification characteristics), while the third is to determine identifiers that can unambiguously discriminate, which we refer to as 'definite identifiers'.

The research approach was archival, descriptive, and experimental. The material properties of silver dye bleach prints over the years were collected from the Cibachrome Association (archive) and scientific literature. A mixed-method questionnaire was conducted among 20 professionals from the art and heritage conservation, printing, and nanotechnology fields to determine currently used identifiers. The collected identifiers were tested for their accuracy and feasibility on numerous objects. The key study object was a distributor sample set of 40 Ilfochrome and IlfoColor prints. Light-emitting diodes, incandescent, and fluorescent lights, UV-A LED lamps at 365 nm, a Leica microtome, a Hirox RH-2000 digital microscope, and an X-Rite i1 spectrophotometer were used for the assessment.

Archival research reveals that Cibachrome/Ilfochrome has four umbrella product lines that differ in functions and thus in emulsion design. Examinations demonstrate that reversal prints, one of the two types of chromogenic prints, use a positive-positive process and have an image dye layer order identical to that of silver dye bleach prints. Only five out of 23 collected identifiers are unambiguous: back print, bleach holes, redshift, colour inconstancy, and remission spectra. The back print is often absent; the latter four indicate the azo image dyes of silver dye bleach prints. Finally, an identification route map was designed to indicate how unambiguous results can be obtained.

To conclude, the conventional identification approach relies on the processing procedure and the order of image dye layers; however, the similarities between silver dye bleach prints and chromogenic reversal prints nullify this approach. This research demonstrates that directly approaching azo dyes allows for definite identification. Four methods are found to identify azo dyes. However, the redshift spot test is destructive; the observation of colour inconstancy requires an image to have a neutral grey; the identification of bleach holes requires a high magnification; and the morphology of remission spectra is objective, quick, and non-destructive but instrumental. Future explorations of methods to identify azo dyes would be desirable.

An Evaluation of the Suitability of Microfade Tests for Color Photographic Prints Made with Modern Digital Printing Technologies and Historic or Contemporary Analog Color Printing Systems

Henry Duan, Henry Wilhelm and Richard Adams

1 U.S. National Archives and Records Administration U.S., 2 Wilhelm Imaging Research, (WIR), Inc., U.S., 3 Ryerson University, Canada

The technology of microfade testing was developed in the 1990s by Paul Whitmore. It focuses extremely high intensity light from a xenon-arc lamp into a tiny spot, while limiting the exposure duration so that fading is not visually noticeable. This test method has become widely practiced in cultural heritage collections as a screening tool to identify objects containing fugitive colorants and require caution when displayed or loaned to other institutions.

Light intensities in microfade tests can reach as high as 2–6 Mlux (V. L. Beltran, "Advancing Microfading Tester Practice," The Getty Conservation Institute, 2018). The intensity of direct outdoor sunlight at noon in the summer can be in the range of 110-120 Klux. Therefore, the light intensities used in microfading tests are on the order of 20 to 50 times higher than direct outdoor sunlight. Accelerated light fastness tests conducted at WIR are generally at 25 Klux, with selected print materials tested at 1.35 Klux for much longer periods. Display illumination for photographs in museums ranges from 50 to 250 lux. The challenge is how to properly interpret light fastness test results made with an extremely high light intensity over a very short period and reliably predict the risk of actual image fading during museum display under far lower light intensities with much longer durations.

Instances of reciprocity failures in the accelerated light-fading of color photographs were first documented in the 1993 book, "The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures," by H. Wilhelm and C. Brower: "Reciprocity Failures in Light Fading and Light-Induced Stain Formation." It was shown that results of lightfastness from accelerated light-fading tests are impacted by the levels of light intensity that the prints were exposed to. The light stability of chromogenic, inkjet, and other color photographic materials spans an extreme range, >1000:1 between the most and the least light-stable media (H. Wilhelm, et al., IS&T, 3/2007).

This study evaluates the risk of reciprocity failures and its image media dependency by comparing the lightfastness of different color photographic materials tested with xenon arc and LED microfaders vs. a conventional fluorescent light-fading chamber. The range of media includes pigment and dye-based inkjet prints, chromogenic prints, Cibachrome prints, Polaroid prints, and other media. Selected print specimens were drawn from "The Wilhelm Analog and Digital Color Print Materials Reference Collection," which spans a 51-year period from 1971–2022.

SESSION 7 – September 16th 2022, 4:30 pm – 6:00 pm

Fine Art Printing in the Kodak Dye Transfer Process at the CVI LAB: 1981-2022

Guy R. Stricherz and Irene Malli

CVI Lab, United States

The CVI LAB (Chromatic Vision Imaging Laboratory) is a fine-art dye transfer printmaking atelier owned and operated by Guy Stricherz and Irene Malli. CVI opened its doors in New York City in 1981 for the sole purpose of making the finest possible color photographic prints for fine art photographers wanting to produce editions of their work. In 2004 we moved the lab and ourselves to Vashon Island in the state of Washington, where we continued to make prints with the Kodak Dye Transfer process using the original matrix film, dyes, and paper acquired from Kodak and others after the company stopped manufacturing the materials in 1992.

First introduced in 1946, we believe the Kodak Dye Transfer process to be the ultimate method to date for the making of fine photographic color prints. The inventor of the process was Louis M. Condax in collaboration with the Eastman Kodak Company. With over eighty years of combined experience, we have developed many techniques and methods we utilize to improve and master this historic and little understood dye imbibition process. This is the last of the three-color separation and assembly processes, and although it is a very tedious, laborious, and expensive process, in expert hands it is capable of rendering a print of unequalled beauty. With an extremely wide color gamut and a very long tonal scale the double-weight baryta paper has no silver or processing chemicals affecting the projected dark storage life that may exceed five hundred years. It is the only process that utilizes the same dyes to spot prints as used in making the prints.

Over the last forty-one years we have printed and editioned over fifteen hundred images for more than sixty fine-art photographers. This includes editions, exhibitions, and boxed portfolios.

As fine-art photographic color printmakers, we have been fortunate to have the iconic Kodak Dye Transfer process available as our medium of choice for our life's work. This has enabled us to assist each photographer we have worked to realize their vision of each print we have made. In 2021 Stricherz and Malli ceased to offer their printmaking services to the public, although a small number of prints will continue to be made for a longstanding client and for their own work.

Interferential colour plates from the 19th c. to the 21st c.: characterization and preservation

Marie-Angélique Languille[1], Nick Brandreth[2], Vincent Guyot[3], Bertrand Lavédrine[4] and Carole Sandrin[5]

1 CNRS, France

2 Artist photographer, U.S

3 Société Française de Photographie, France

4 Centre de Recherche sur la Conservation – MNHN, France

5 Independent researcher, France

Lippmann plates [1] have been of great interest to physicists up to the present day. It is undoubtedly the physical principle of recording colours by interferences in the sensitive material that motivates many physicists to explore the spectral nature of these images [2]. Less work has been published on the preservation of these plates [3-5]. Indeed, until recently, these plates have been little presented to the public, outside the academic or educational fields. In 2021, the Preus Museum opened a temporary exhibition of interferential plates, while Photo Elysée, Museum for Photography, will exhibit plates by G. Lippmann in 2023 and has initiated a catalogue raisonné of Lippmann plates worldwide.

We will present here the preliminary results of our research on the preservation of interferential plates with a double approach of the study of contemporary plates [6] to historical plates. The objective of better understanding the behaviour of these plates through the ages and storage conditions faces a major obstacle, that of access to the image layer, as most interferential plates are mounted with a prism for better visualization. We will explain the methodological research for the characterization of the materiality and stability of contemporary plates, by combining several spectroscopies and microscopies. We will also show the first results of characterization of the image layer of 7 unmounted plates of the Société Française de Photographie (SFP) among which some are attributed to Georges Goddé (1856-1909), an active member of the SFP. We will conclude on the direction that our research on these interferential plates will take as Paris has two major collections: one at the SFP, the other at Sorbonne Université where G. Lippmann's Laboratoire des Recherches physiques was located.

[1] Lippmann, G. 1891. ‘La photographie des couleurs’. Comptes rendus hebdomadaires des séances de l’Académie des sciences (112): 274-275.

[2] Baechler G., Latty A., Pacholska M., Vetterli M., and Scholefield A. 2021. ‘Shedding Light on 19th Century Spectra by Analyzing Lippmann Photography’. Proceedings of the National Academy of Sciences 118 (17): e2008819118.

[3] Martin P. and Sandrin C. ‘Exhibiting Gabriel Lippmann: a collaborative challenge’ in Gabriel Lippmann's Colour Photography: Science, Media, Museums, Hannouch H., Amsterdam University Press, to be published in 2022.

[4] Gold J. ‘The Lippmann color photograph – identification and physical properties’. 2021.11.02, Colour Fever Celebration, Victoria and Albert Museum.

[5] Giatti A. 'The Lippmann plate at the Fondazione Scienza e Tecnica in Florence' in Cattaneo B., and Marchiafava V. 2021. Colour Photography and Film: Sharing Knowledge of Analysis, Preservation, Conservation, Migration of Analogue and Digital Materials – 2021. Edited by Picollo M. and Cherubini F. IT: Gruppo del Colore - Associazione Italiana Colore.

[6] https://www.nickbrandreth.com/photography/lippmann-plates

Use of High-Resolution Multispectral Imaging and Analysis Systems for the Very-Long-Term Monitoring of Photographs, Paintings, Documents, Books, Fabrics, and Other Works of Artistic and Historical Importance

Ken Boydston[1] and Henry Wilhelm[2]

1 MegaVision, Inc., U.S.

2 Wilhelm Imaging Research, Inc., U.S.

The MegaVision multispectral imaging and analysis system is being used in the cultural heritage field to derive highly accurate CIE L*a*b color images of objects from narrow-band LED illumination in the UV, visible, and infrared regions.

A set of narrow-band LEDs might include the following wavelengths:

UV: 365nm

Visible: 445, 470, 505, 530, 570, 617, 625nm

Infrared: 700, 735, 780, 870, 1050nm

Full colorimetric data can be recorded for more than ten thousand individual locations on an image, allowing for a detailed analysis of changes that may occur over time in every part – both large and very small – of an image. Images may be monitored in their frame, under or acrylic. Capture times are from one to three minutes, depending upon the number of separate wavelengths that are recorded. The number of individual locations on an object has no influence on capture times.

The system can quickly generate extremely accurate color images of objects for use in institution's acquisition records, websites, and publications.

The system is presently being used for the long-term monitoring of the Dead Sea Scrolls in Israel and at the United States Library of Congress for monitoring important documents and other objects of historical significance, especially before and after they have been placed on display.

However, there are manyproblems to consider for very-long-term monitoring programs that may extend for several thousand years:

1) The measurement instruments will need to be replaced many times over such a long period, and calibration systems that will allow correlation from one system to the next must be established.

2) Data recording formats, software, computational systems, and color measurement methodologies (the several present variants of Delta E, for example) will repeatedly become obsolete and require accurate transformations to new systems.

3) Carefully selected sets of systems calibration targets of representative colors with proven very high stability will need to be maintained for each monitoring project.

4) Secure humidity-controlled freezer preservation at minus 20°C or lower temperatures of representative materials in a collection that is being monitored offers great potential for the continued accurate calibration of new systems.

The digital era marks the first time in human history that it is possible to make perfect duplicates of still and moving images and alphanumeric data, and to store these exact duplicates in dispersed geographic locations and in electronic locations (e.g., 'the cloud"). It is possible to do this quickly and easily, including with fully automated systems, and at very low cost.

That is why, for the first time in human history, it is now possible to accurately monitor changes that may occur with cultural heritage and other materials into the far distant future. This presentation will discuss key strategies that the authors believe to be necessary to accomplish this goal.

Léon Vidal's Photochromy: Study of the process in albums Le Trésor Artistique de la France at The Rijksmuseum

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The collection at the Rijksmuseum in Amsterdam holds two albums with 39 photomechanical prints corresponding to the most famous publication containing Léon Vidal's photochromy process: Le Trésor artistique de la France. These albums were published in Paris in 1876 by The Société Anonyme des publications périodiques, under the direction of Paul Dalloz, and were printed in the atelier Le Moniteur Universel. They reproduce with different photomechanical process a variety of notable images of artistic objects at the Musée du Louvre, accompanied by explanatory texts. The examples encountered in the albums are monochrome collotypes and woodburytypes, but the majority are images in colour made with the process of Photochromy.

The Photochromy is an uncommon photomechanical colour process introduced by Léon Vidal in France in 1872. It is a hybrid process where the prints are made with different layers of chromolithograph images and woodburytype on top. This process allows to reproduce precious objects with a high quality of details. The final result is a spectacular image with 3D effect and relief. Orell Füssli Swiss company patented in 1880 a variation on Vidal's process called Photochrom.

The aim of this work is to understand the materiality of the Photochromy process to better conserve and treat these objects. This project begun with the characterization and visual examination of Vidal's prints using two different analytical techniques: digital microscope and

UVA-Induced Visible Fluorescence. These techniques allowed us to observe the surface of the prints as well as their general condition. Photochromy prints are made on baryta paper, with an emulsion of gelatin where the final image is contained. The image is made with pigments. The prints are presented in passe-partout on each page of the album. They were in good condition besides the fact that some presented mold attack. Other relevant damage was the formation of a ghost image on the passe-partout in contact with the image, which was only visible through the application of UVA-Induced Visible Fluorescence. XRF analysis was performed to get information about the composition pigments used in the chromolithography layers and the inorganic components in passe-partouts. Finally, the results of the analytical techniques were compared with literature published by Léon Vidal about his innovative colour invention. The findings will shed more light on these uncommon photomechanical colour process and provide more information about appropriate treatments and long-term preservation procedures.

The Colour in Nicola and Elvira Notari's Italian silent movies

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Around the 1920s, the film production of Film Dora, a Naples film production house founded by the spouses Elvira and Nicola Notari, was very active in Italy. Nicola Notari was born in Naples and was a photographer and film producer, Elvira Coda moved in the early twentieth century to Naples where she met Nicola and after a few years they got married.

Elvira Coda Notari was among the first female filmmakers in the history of cinema and in Italy she was the pioneer of Italian cinema and the forerunner of Italian neorealist cinema.

Author and director of highly successful silent movies, which tell in particular Neapolitan dramas, Elvira had started her career by helping her husband in the activity of coloring before the photographs and then the frames of the films of their production.

As in France, thanks to the Pathé film of the brothers Charles and Émile, the first colored films were made in Italy too: copies of black and white films were colored manually, frame by frame. These films are important Historical cinematographic Italian Heritage.

This contribution presents a brief review of the filmic works produced and make precious by an expressive point of view, thanks to the technique of hand coloring, by the film house Film Dora in the early decades of the twentieth century.

An Overview of Critical LED Lamp Properties Related to the Fading of Photographic Prints in Image Permanence Testing

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Although the use of LED lighting is now very common in museums and galleries, there are not yet any confirmed image permanence standards for LED lamp exposure of photographic and graphic arts prints. This paper comprises an overview of the considerations involved in the selection and classification of LED lamps for use in an image permanence test method standard that is currently under development by ISO Technical Committee 42. Relevant lighting parameters of color rendering indices, relative spectral irradiance, and correlated color temperature will be discussed. The advantages and disadvantages of different methodologies for the measurement and classification of these parameters will be assessed. The effects of these parameters on the fading and color changes in photographic prints under LED lamps will be compared with fluorescent and tungsten-halogen lamps. The paper will conclude with a summary of ongoing research and the next steps in the development of the LED lamp image permanence standard test method.

KEYNOTE JOEL MEYEROWITZ