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HISTORY OF PHOTOGRAPHY ON THE EXAMPLE OF SELECTED PHOTOGRAPHIC TECHNIQUES. A PHOTOGRAPH AS AN OBJECT

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The fact that afterimage can be created with the use of chemical compounds had been known earlier, however people were unable to make these pictures durable, neither did they known what to practically use them for. The first to have noticed the properties and chemical reactions of gold salt under light was Heinrich Schulz in the early 18th century. Another important individual in this story was Joseph Nicéphore Niépce who tried to apply the knowledge and the rules of actions of camera obscura experimenting with printing techniques based on Bitumen of Judea. His searches led him to inventing heliography. This is the process that created the oldest preserved photograph taken in 1826: View from the window at La Gras. The original seems a blurred granular afterimage, however Niépce was able to stir interest in his invention among influential public, namely members of the English royal family and the Royal Society. The works gained real momentum when he joined forces with Louis Daguerre. Following the sudden death of Niépce, Daguerre continued his research aimed at the practical possibility of applying photography to capture images. The announcement of the discovery of daguerreotype in 1839 was widely publicized. Daguerre was suported by both the French government and the monarchy. The patented invention of daguerreotype was personally purchased by King Philip, and later donated to the people of France and other peoples of the world, except for England. A year later, József Petzval applied the first achromatic lens which allowed to obtain light contrasted images exposed over less time. Photography stopped being a curiosity, turning into a tool that settled for good in social awareness.

Information on the new invention spread across Europe really fast. For instance, the first article in Polish press was published immediately after the public announcements of the patents in 'Magazyn Powszechny',[1] while the first presentation of daguerreotypes was held in Warsaw on 13 October 1839. At the Warsaw Society for Charity in total five daguerreotypes were displayed, of which two had been executed by Professor Jędrzej Radwański, and presented the views of old Warsaw.[2] Aleksander Maciesza wrote the following on the event in his *History of Polish Photography: October 13, 1839 was memorable for Warsaw residents. Since they were provided with the opportunity to see the wonderful invention of which all the periodicals had been writing, and of which France had been boasting… For the first time in Poland, the Society for Charity displayed for public viewing a daguerreotype sent from Paris, and showing the Notre*

1. Marek Noniewicz, untitled; negative contact print on salt paper, contemporary print / artist's own work

Dame Church... Several days later a daguerreotype with a view of Berlin arrived, while J. Radwański sent in his first daguerreotype showing the Church of the Nuns of the Visitation in Krakowskie Przedmieście Street.[3]

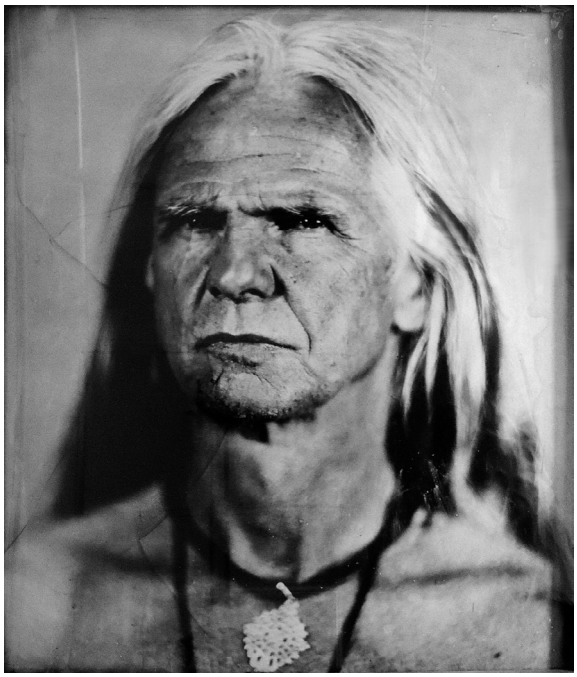
This was the first known and documented presentation of daguerreotypes in Poland, soon followed by the establishment of pioneering photographic studios, of e.g. Józef Giwartowski and Karol Beyer. The great advocate and promoter of photography Maksymilian Strasz a short time later published in the supplement to 'Gazeta Codzienna' *a detailed description of making daguerreotypes*, this based on Daguerre's brochures and information and innovations published in 'Wiadomości Handlowe i Przemysłowe', while in 1857, he published the first photography manual titled *Photography, namely a Set of Means Used to Take Images on Paper or Glass with the Use of Light*.[4]

Initially, to individual's uninitiated into chemical secrets photography appeared technically intricate, therefore at first it seemed as not possible to be applied widely. The development of photography was accompanied by a philosophical and esthetical discourse. Seeing one of Daguerre's photos, Paul Delaroche is reported to have exclaimed: *today painting has died*![5] Daguerre thought that art was unable to imitate the precision and detail achieved in daguerreotypes.

The French poet and critic Charles Baudelaire compared photography to a devil's tool.[6] Joseph Nicéphore Niépce pointed to the automatism of photography and its detachment from the subjective conditionings of the author,[7] while the leading representative of academic art Eugéne Delacroix was of the opinion that the process connected with the creations of photos: a mechanic action, simplicity, wide availability to uneducated individuals, eliminated the principles of art and composition: *The imperfection of photography, he wrote, paradoxically stems from its excessive perfection. Thanks to this perfection and precision... it dazzles and falsifies the image, it threatens the lucky incapacity of the eye to spot the finest details.*[8]

Photographs as display objects came to existence equally fast. The first presentations of daguerreotypes took place immediately following their invention, though the professional and breakthrough events developed only several years later. The inauguration can be found in the 1851 First World Exhibition in London where next to the equipment and lenses, also photographers had their works displayed. The second event was a photography display shown in the upper part of the London South Kensington Museum in 1858 during which exhibits of the London Photographic Society and of its France's counterpart were simultaneously presented.

The latter event was participated by the most illustrious photographers of the time, e.g. Henry Fox Talbot, Roger Fenton, or Gustave Le Gray.[9] This was an ennobling fact for the photographic circles, manifesting openness to embrace the new medium, and the interest in it by museums' directors and curators. This development also posed



2. Łukasz Gietka, untitled; ambrotype, contemporary print / artist's own work

a new challenge to museum curators and photographs' authors regarding the way of displaying photographs. In the preserved photo presenting the display, taken by Charles Thurston Thompson, we can see a tightly filled room with photos framed in light passe-partout. Other works exhibited on small tables could be viewed with the use of special glasses: stereoscopes. One of the critics described the event with the following sentence: *Altogether, whether for light and shade, breadth and dignity, atmosphere and detail, this Exhibition is an advance on the efforts of last year. The artists go on boldly, and are not afraid to be chemists; the chemists gain courage, and long to be artists* (Athenaeum, 20 February 1858)[10]

The above-mentioned daguerreotype process consisted in developing the image directly on a polished plate placed inside the camera. The side of the plate that was silver-plated, either by electroplating or by plating, was sensitized with iodine steam, this creating silver iodide. Following the exposure to light, the image (daguerreotype) was developed with mercury vapours; the process sometimes required some dozen minutes, that is why ateliers and photographic studios were equipped with special seats featuring a head-rest. With time, the technique was enhanced by using a mixture of iodine with bromine.

Daguerreotypes were fixed in solutions of sodium chloride or sodium thiosulfate; furthermore, toning with gold chloride could be applied, this enhancing the image's contrast, giving it a more noble appearance and a physically reinforced surface. The latter was varnished and coloured with pigments. Apart from daguerreotypes made on plates as a standard, there were also some on paper. The paper was first immersed in an ammonium chloride solution, to be subsequently dipped in the diluted solution of silver nitrate. The humid paper was later fumed in hydrogen sulphide, silver bathed, and sulphatized again.[11]

Daguerreotypes are extremely sensitive to the environment conditions as well as to those in storage spaces. Therefore, apart from the plate itself, a daguerreotype was built of a tightly-sealed glass-covered casing. The picture's degradation usually started from the edges, maybe owing to insufficiently-tight sealing of the framing, a crack in the glass, or lack of the protective glass. According to Zenon Harasym, there is no single universal mode to mechanically restore daguerreotypes. One can, for example, having dismantled a daguerreotype, wash the glass, or try to clean the daguerreotype chemically as proposed by the Missouri Historical Society in a solution of distilled water, thiourea, phosphoric acid.[12]

Another material to quickly win widespread popularity in photography was paper which being easily available and cheaply produced, as well as offering a durable base, with time supplanted the photographs taken on glass or metal plates. The first trials were taken by the English inventor Fox Talbot who, using ordinary table salt and silver chloride, discovered that paper covered in such a solution darkens in sunlight, and if a fragment is covered, for example with a leaf, white patches remain in the place of such an object. He named the process photogenic drawing.[13] This is only one step away from calotype (alternatively called talbotype from the name of its inventor) in which paper began to essentially serve as the negative-matrix. The technology invented by Talbot had many advantages over the process invented by Daguerre, since from one negative a countless number of contact positive copies could be obtained. Though the process did not become more widely popular, the very thinking in terms of: 'from the negative to the positive' provided grounds for the future development of photography.

In Poland, the first calotypes were produced by e.g. Maksymilian Strasz and Karol Beyer, whose attempts, however, failed, and further works on popularizing the process were given up. The first prints made of calotypes directly on salted paper were not satisfying, so the attempts were made to improve the process. In later years, papers coated with the solution of albumen invented by Louis Désiré Blanquart-Evrard were applied. Before being coated with light-sensitive emulsion, the albumen papers were first soaked in the solution of egg white and sodium chloride. The use of albumen was also tested on other materials, such as glass. Albumen papers began to be widely used in the second half of the 19th century, winning great popularity, so owing to this we can be almost sure that when viewing photograph collections from the turn of the 20th century we have to do with photographs obtained in this process. The use of albumen proved to be a relatively durable technology, maybe because of the fact that almost all the albumen prints underwent gold toning. The toning did not only bestow a noble warm shade upon the prints, but first of all removed excessive silver chloride that could have remained on the photo surface, and prevented it from any further chemical reactions. The albumen process supplanted both the daguerreotype and collodion processes. It allowed a more precise detail rendering, yet, first of all, the repeatable character of the effects.

When chemical conservation is needed, of e.g. albumen paper, Zenon Harasym recommends the Kodak Film Cleaner

as well as cleansing with denatured alcohol.[14] In the event of such changes as stains and decolouring of the image in photographs taken with the albumen process, resulting from chemical processes, the recommendation is bathing in a solution composed of: potassium (3 g), copper sulphate (6 g), and distilled water (100 ml).

Another process very popular in the second half of the 19th century was the collodion water plate process, Wet Plate for short. Its invention is attributed to Frederick Scott Archer (1851) and earlier-mentioned Gustav Le Gray. The glass collodion plates were then used to make contact copies, for example through the albumen process. Collodion solutions were also used in derivative techniques: ambrotype, ferrotype, and panotype. Collodions were most frequently based on silver iodide or bromide. Following the development of the glass plates covered with the collodion solution, a negative was received, and this could be copied as a positive. Ambrotype was, in turn, nothing else but a 'positive' effect in the wet collodion technique achieved by covering the other side of the glass: the background with a layer of varnish (could be based on asphalt, pasted black paper or canvas).

Collodions and ambrotypes in view of the process of creation and the used materials could be easily damaged; Juliusz Garztecki in his paper the *Collodion Method in Photography and Conservation of Collodion Negatives* observes that the process was technologically quite complex and partially unpredictable. It was called 'wet', so everything caused that the technology had a large number of disadvantages and its own limitations because of the use of a portable darkroom which one really needed to have at hand all the time.

During a potential chemical restoration of the photographs taken with the use of this process one has to bear in mind that the collodion emulsion composition could vary. This due to the fact that half-finished products could have been home-made, resulting e.g. from spirit distillation, and depending on the quality and availability of reagents.[15] Zenon Harasym provides certain means of repairing and renovating collodion photographs, this possible obviously depending on the kind and degree of damage (mechanical, chemical).[16] In the case of mechanical damage, repair is often impossible, however if a photograph is tarnished or patinated, or if the image has partially disappeared, it can be restored by means of bathing the photograph in a solution of distilled water and thiourea.

In Poland, the photographer to apply the collodion technique was e.g. Walery Rzewuski, who next to Ignacy Krieger and Awit Szubert was one of the most appreciated Cracow photographers.

The next process that supplanted the wet collodion, while making photography more accessible and mobile, and opening up prospects for its development, was the technology of a dry plate invented in 1871 by Richard Leach Maddox. Contrary to collodion, this process allowed to prepare materials beforehand; they had to be loaded into the camera case at an appropriate moment, to be later elaborated in the studio at ease.

The basic component of the dry plate was a gelatine-bromide emulsion. After exposure and development, a glass negative was obtained to be later contact-copied on baryta paper coated in gelatine, the latter introduced in the late 19th century. The paper could be either in its variant with silver bromide or silver chloride. The dry plate process began to disappear in the late 1920s, when the glass foundation gave way to nitrocellulose negatives. Initially, attempts were made to use paper negatives instead of the glass ones, yet in 1887, William Walker together with George Eastman patented the celluloid foil, and a year later they introduced the first camera (constructed by Frank A. Brownell) based on this carrier called Kodak 1 into mass production. Its advertising slogan read: *You Press the Button, We Do the Rest*.[17]

Poland, too, tried to keep pace with the new tendencies: let us recall here that in 1888 on the corner of Konopacka and Stalowa Streets in Warsaw, Piotr Lebiedziński opened a workshop manufacturing photographic paper.[18] His first kinds of paper were for photography in daylight using gelatine with silver chloride as the emulsion. As of 1907 Lebiedzieński's workshop started producing paper applicable to copying in artificial light.

Silver papers began to dominate as of the 1920s until the end of the century, when silver prints, together with the development of digital photography slowly supplanted ink prints on baryta papers.

Similarly as in the case of the albumen papers, silver papers also required toning, which actually was essential when chloro-silver papers were used. The basic component used in the fixing baths was sodium thiosulfate. Occasionally, in order to achieve a definite shading, toning was applied with the solutions of gold chloride, sodium sulphide, sodium selenium sulphide, or ammonium polysulphide. Protective varnishes were also laid, these additionally enhancing contrast, adding gloss or specific texture. They could be made up of gelatine, collodion (solutions of nitrocellulose, ethyl ether and acetone or ethanol), gum Arabic, dextrin. Sometimes varnish was organic, on a resin or wax base.[19] Together with the technology development, the range of silver papers increased; depending on the needs, the following could be used: gelatine-silver papers on baryta foundation; papers on polyethylene (plastic) foundation; multi-grade papers; fixed-grade papers; glossy papers; matt papers; satin papers; double-weight papers (photographic paper of higher grammage).

Baryta papers with a gelatine-based emulsion also suffer image degradation. It usually adopts the form of discoloration or stains, and begins from the edges (fading, yellowing, contrast blurring). Other degradation forms of the base are: brittleness, shrinking, cracking. Many of these changes are irreversible, and are a natural result of the aging of organic materials or bad environmental conditions (of storage and display), moulds, fungi, temperature, light effects (electromagnetics radiation). Another degradation type results from chemical reactions which may be due to insufficient fixing of the photograph or other chemical processes taking place in reaction to the photo contact with the framing (acidity of the paper, base, frame). Additionally, the paper base is an excellent nutrient to bacteria and insects, and if this gets destroyed, it will translate into the loss of the photographic image.

One of the processes defined as manipulative or artistic is gum bichromate. Its main development occurred in the late 19th century when a part of the photographic circles

3. Marek Noniewicz, from the *Night Bird* series; albumen positive editing print, contemporary print / artist's own work

changed their approach to photography, seeking in it the means of artistic expression. The process is attributed to Alphonse Louis Poitevin who, when working on the pigment process experimented trying to replace gelatine with gum Arabic. It coincided with the period when both in fine arts and design some tendencies voiced the need to renew art. Such was the atmosphere in which the first associations and artistic movements connected with photography were founded: Wiener Kamera-Club (1891), The Linked Ring in London (1892), Photo-Club de Paris (1894), Photo-Secession in New York (1902). One of the most important galleries of the time in which the latest achievements were displayed were the Little Galleries of the Photo-Secession in New York, also known as '291'.[20] The activity of those first associations was important because its members had a great impact not only the public opinion, but on the fact that many prestigious museums and galleries opened up their spaces for photography, e.g.: the Royal Academy in Berlin, the Hamburg Kunsthalle, as well as the Albright, Carnegie, and Corcoran Galleries in the United States. The promoting activity was assisted by critics, e.g. the American poet Sadakichi Hartmann, who wrote reviews for the 'Camera Notes' published by Alfred Stiglitz. Organizing in 1902 the Exhibition 'Pictorial Photography, Arranged by The Photo-Secession' at The National Arts Club, Stiglitz claimed that the synonym of photograph pictorialism is the manifestation of the *highest form of modernity.*[21]

In Poland, gum bichromate became popular thanks to the exhibition of the Vienna Camera-Club in Lvov. The potential of the new technique was spotted by two young Lvov photographers: Józef Świtkowski and Henryk Mikolasch, who soon became masters in it. A good example of Mikolasch's technical advancement is the three-colour gum titled 'Blue Flask' (1914) kept at the National Museum in Wrocław. The Polish equivalent of pictorialism is 'picturesque photography' used by Jan Bułhak, who fascinated and inspired by the ideas of the representative of Young Poland's Avant-Garde Ferdynand Ruszyczyc, introduced his ideas into photography.

Pictorialism did not limit itself to the gum bichromate technique; photographers often used the optics as such, softly drawing the lenses to achieve softness and painterly lines. What they also applied, in the painting manner, was a synthetic composition cleared of the documentary narrative. In Poland, pictoralism went along its own separate search path, and never lost its entirely photographic character. The pre-WW II ideas of pictoralism cannot only be found in the post-war period, but they have continued to echo until today within the circles affiliated with artistic photography. Pictorialism's advocates included, among others: Jan Bułhak, Antoni Węcławski, Tadeusz Wańskiego, and Stanisław Sheybal.

Gum bichromate made it possible to apply emulsion with a brush, to modify the work at its every stage, to remove unwanted fragments, as well as to change contrast. Thanks to the layers, the image can be coloured or monochromatic; by adding layers, it can maintain its naturalistic quality or contrariwise: it can create pure abstraction or a symbolic work.

As far as chemistry is concerned, gum bichromate, contrary to the majority of the processes, does not use the sensitivity to light of silver or ferrous salts, but is based on the qualities of sodium chloride. The works executed in the gum technique have been relatively well preserved; the gum structure, the applied pigments are more resistant to external factors than those based on silver compounds. In the case of multi-layered gums there is always the possibility that respective layers shrink differently, hence it is so important what environmental conditions they are preserved in.

The pigment process should also be ranked among the processes that use light sensitivity of biochromate compounds and chromates of alkaline metals. It acts analogically to the gum technique: *in the exposed places, the emulsion is cross-linked and there what remains is the pigment suspension in colloid, while the remaining places are rinsed in the bathing (developing) in a water process*.[22] The light-sensitive layer is quite thick; after the image is developed and the untanned gelatine rinsed out, a relief is created that resembles a convex print in the shadows and concave in the light. Powdered coal or soot were used as the pigment. The first research in this process was conducted by Alphonse Louis Poitevin, but it was only Joseph Wilson Swan who worked out the means of transferring the pigment print onto a new foundation in 1864. Shortly afterwards, pigment papers were mass-produced, e.g. by Fresson or Auto-Pastell.

According to Zenon Harasym, pigment processes are usually well preserved, since durable pigments were used for it, which with time do not enter in chemical reactions when exposed to light.[23]

The process based on light sensitivity of ferric salts reducing silver salts after exposure to metallic silver is kallitype, being also a manipulative technique, often confused with Vandyke's brown because of the photo tonality. It was worked out and patented in 1889 by William Walker James Nicol. The brown shades of the copies after toning, in e.g. a platinum solution, can be easily changed to black, this increasing the durability and chemical resistance of the photograph. Preparing the light-sensitive paper in kallitype is similar to that of preparing paper in cyanotype. Paper is coated with a light-sensitive solution and dried, and subsequently contact-printed.

The already-mentioned Vandyke brown is similar to kallitype. This process was initially elaborated by John Herschel in 1842, however only in 1889 W.W.J. Nicol, when working on kallitype and other derivative processes, patented

4. Jan Bułhak, *View of Vilnius*, interwar period; historical print / private collection of Ryszard Karczmarski

(Photo 1, 3 – M. Noniewicz, with the consent of the author; 2 – Ł. Gietka, with the consent of the author; 4 – with the consent of Ryszard Karczmarski)

the first practically applicable process based on salts of iron and silver. A press publication explaining the chemical process and the related technical issues was released in the American 'Photo-Beacon' journal in October 1895 by Arndt and Troost. The Vandyke process is based on ammonium-iron citrate and silver nitrate compounds.[24] Exposed prints are developed through water bath, following which they are fixed by means of a sodium thiosulfate solution. Photographs produced in the process are characterized by high image stability, soft tonal transitions, yet first and foremost by a beautiful brown colour-range echoing the browns that can be found in Van Dyke's oeuvre, hence the name.

In the cyanotype process, the light-sensitive substance is ferrous salt (e.g. ferric ammonium citrate) becoming a ferric salt. The image is made up of so-called Turnbull's blue or Prussian blue, depending on whether potassium ferricyanide or respectively potassium ferrocyanide are used. Through toning, the shade of the print can be substantially changed from blue to another colour, e.g. sepia, black, or violet. This process is also attributed to John Herschel who presented the results of his research to the Royal Society of London in 1842.

According to Zenon Harasym, what characterizes the cyanotype process is that compounds penetrate deeply into the paper structure.[25] Photographs produced in this process are quite durable, though with time they degrade and fade. Cyanotype can be easily renovated through a bath in a solution of hydrochloric acid (2%).[26]

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I believe that due to specificity of photographs it is worth talking briefly about storing and displaying photographic materials. Since the emergence of photography in the late 1830s, many processes and photographic materials have been researched, this leading to the discovery that photographs are not fully durable objects, they undergo change with time, and in due course manifest image degradation, Each photographic material, glass or nitrocellulose negative, reacts differently to harmful reagents. Our surroundings, for civilizational reasons, is the environment that is full of compounds detrimental to photographs and light-sensitive materials. What Juliusz Garztecki considers particularly harmful to them in his paper are: sulphur oxides, nitrogen oxides, hydrogen sulphide, ammonia, peroxides. The presence of these chemical compounds in the environment in which we store photographic materials and photos may lead to the degradation of images or of photographic materials: whitening of the silver image (negative fading), yellowish stains turning dark brown on emulsion, characteristic fading beginning at the edges and moving into the photo centre.[27] The author also points to the fact that in the museum rooms in which photographs are stored there should be no objects or facilities made of rubber, since they contain many free sulphur compounds.[28]

According to Garztecki, the optimum environment for collodion and nitrocellulose rolls, as well as positive and negative materials, are low humidity and stable low temperature.[29] Garztecki's opinion relating to negatives' storing can

be confirmed also in other papers, e.g. in *The Conserve-O-Grams* Programme recommendation is formulated to store collections in a cool environment of controlled humidity, to use vapour-tight containers if the materials need to be warmed for an exhibition or display or portable coolers to transport the collections between museums if a photograph e.g. has to be taken outdoors.[30]

The explanation why photographic materials need to be kept in a low-temperature environment can be read in the paper shared by the Museums Galleries Scotland:

(…) *maintaining a cool dry environment is essential for the long-term preservation of photographs. One of the main reasons for this is because the rate of fading of photographic material accelerates sharply if the relative humidity rises. Fading is usually most noticeable in the loss of highlight details* (…) *Several other forms of degradation of photographic material are also accelerated if the relative humidity and temperature are raised.*

On the other hand, too low relative humidity in the direct environment of photographs may cause brittleness of some of the bases. For example in such museums as the Art Institute of Chicago or the Photography collection at the Museum of Modern Art in New York, a controlled environment is maintained with the fixed temperature of 60°F (15.6°C) and fixed relative humidity of 40%.[31]

As for the temperature, it should be borne in mind that in 1889–1939, cellulose nitrate was generally used for films and negatives. It is an unstable and dangerous material, since *as it ages and degrades, it gives off gases that are harmful to the rest of the collection*. Furthermore, with age its autoignition temperature lowers, and may fall to 48°C.[32]

Photographs have to be protected not only against high temperature and its fluctuations, as well as its sudden changes or high humidity of storage rooms. Additionally, attention should be paid to all the possible chemical and microbiological pollution, as well as UV radiation. These factors, in turn, may lead not only to the degradation of the image itself, but to the growth of mould that can nurture microorganisms. *The presence of microorganisms on any of the objects kept within the storage space can lead to a prompt annihilation of a substantial amount of archival materials. It is the photographic objects created with the gelatine-contained processes that are most vulnerable to this type of damage since gelatine is an excellent breeding ground for microorganisms. A microorganic infection shall not die out spontaneously, and it effects (e.g. emission of mycotoxins by fungi) are harmful to humans as well*.[33]

An issue apart in museology is the very storing of negatives and photographs which are often purchased for the collections in their genuine framing or casing. It used to be a frequent practice to make cardboard files or boxes in which pictures were kept of acid paper or of an unknown pH. Additionally, they are printed over with some paints of an unknown chemical composition. Thus, there is always a danger that harmful compounds can be generated which, in consequence, will react with other components of the photographic objects. After having been taken out of their original container, cleaning, and the possible conservation, the photographs should then be stored in proper photograph-dedicated packagings that have undergone PAT. The latter defines the potential chemical reaction between the packaging and the object. Packaging for photographs should be of the highest possible quality and neutral pH. *Materials safe for archival photographs, including appropriate packaging are defined by the standard ISO: 18902:2013*.[34] Juliusz Garztecki also claims that papers used for museum purposes should be measured with pH-meters. He additionally claims that in contact with photographs the following types of paper should be entirely eliminated: chalk, wrapping, parchment, or wax. The compounds in them can in a longer run affect the stability of the silver image. The same applies to plastic packaging (cellophane, PVC, polyethylene, etc.) in which negatives are often stored. *Such foils, though seemingly chemically harmless and stable, contain remnants of catalysts that can affect the durability of the preserved negatives*.[35] The author observes that the acid pH of the paper causes that sulphur oxides from the atmosphere are absorbed; these, in combination with humidity, can produce sulphurous acid lethal and destructive to photographic emulsions. Similarly, harmful are alkaline compounds or metal salts contained in paper.[36]

The reason for transferring photographs from their genuine packaging to that specially selected in which the collection will be stored can also be found in the glues used for envelopes or boxes. As of the 19th century, bookbinders used mainly organic glues which in time nurtured microorganisms and moulds. In order to foster their durability, such substances as: formalin, creosote, phenol, or alum were added. These can be harmless to silver-containing compounds, they can deteriorate the image, hence the high risk resulting from storing photographs in their genuine packaging. Moreover, photographs should be kept in furniture made e.g. of stainless steel, properly structured, in order to secure ventilation and free air flow, while securing stable storage of heavy objects (e.g. glass negatives).

Apart from conservation and archiving activity, museums that store photography collections are currently faced with the necessity to protect the collections. The desire to make objects available to a wider public is always connected with a definite risk, hence the idea for copies of particularly precious works to be displayed. Today, owing to the capacity of digitizing, there are numerous means that, depending on the display needs and requirements, allow different solutions: from printing digital photocopies of the previously digitized photos on baryta paper, making digital negatives and exposed prints on archival papers, to making a photocopy in the genuine process of the period on the previously digitally accomplished negative. This need for digitizing is the topic shared on the website of the Museum of History of Photography in Cracow: *digitizing processes constitute an essential part of the preservation of cultural heritage, as well as an important step on the way to making the collections available to a wider public: the collections that otherwise do not leave museum storage space. This is particularly important with relation to photographic objects due to their 'double lack of durability': on the one hand delicate paper or glass plates, on the other – chemistry and still ongoing photochemical processes. Photographs, so sensitive to light and atmospheric conditions, are almost ideally made to be closed up tightly in dark storage rooms; it is thanks to digitizing that we stand the chance of becoming slightly better acquainted with this 'wide-spread' however still little accessible medium'*.[37]

Abstract: In the first part of the paper, the focus is on historical and technical aspects of the invention of photography, beginning with the first research works conducted by J.N. Niépce up to the patenting of daguerreotype in 1839 by L. Daguerre. In the further section of the paper emphasis is put on the fast spread of photography; short profiles of the first Polish photographers who contributed to promoting photography: J. Giwartowski, K. Beyer, W. Rzewuski, and M. Strasz, are given. Furthermore, the early-19th-century discourse between the artistic and photographic circles is briefly discussed, with some comments by e.g. E. Delacroix, P. Delaroche, Ch. Baudelaire, L. Daguerre quoted. Subsequently, the early displays of photographs in exhibitions and museums are described, e.g. during the 1851 First World Exhibition in London and at the South Kensington Museum in 1858. What follows this is a presentation of selected photographic techniques, shown against the events related to given inventions, e.g.: daguerreotype, salt print, techniques based on the collodion process, compounds of dichromates and chromates, calotype, cyanotype. Further, source reference is given to describe potential threats related to the degradation, damage, and a possible repair of images recorded in photographs.

Another section of the paper is dedicated to presenting artistic movements in photography which formed in the late 19th century. The final part speaks of the questions related to e.g. storage humidity and temperature, display of photographic objects that are in museum collections, and pH of materials and frames; the author also reflects on the need to digitize collections.

Keywords: daguerreotype, calotype, albumen, ambrotype, collodion, storage and display conditions

Endnotes

[1] ' Magazyn Powszechny' 1839, No. 6, pp. 44-7.

[2] W. Mossakowska, *Początki fotografii w Warszawie (1839–1863)* [Beginnings of Photography in Warsaw (1839–1863), Vol. I, Instytut Archeologii i Etnologii PAN, Warszawa 1994.

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