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# THE SILVER GELATIN PROCESS:

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**Introduction:** Photographic materials have complex physical and chemical structures that present special preservation challenges to the librarian and archivist. Since the birth of photography in the late 1830s, many different photographic processes and materials have been utilized, each subject to deterioration through time and with use. Deterioration is an ongoing natural process, nevertheless much can be done to slow the rate at which it takes place in photographs. Identification of various types of photographs requires a basic knowledge of the history of materials and photographic processes. Through careful observation and examination of photographic material, the collector, conservator, or archivist gets a better understanding of the photographer's working methods, the subsequent history and care of such prints, and the preventive measures required in future storage, handling and display.[1] This poster will give a short overall presentation of some of the working methods involved in the recognition and proper assessment of gelatin silver prints. These images have constituted part of the work done over the course of a three month internship as a preservation assistant with the Glasgow University Archive Services.


Fig 1: Glasgow University Athletic Club as seen c.1912-13. Recto side of photograph shows all 16 members including vice-captain and honorary secretary.

Fig. 2: View of the entrance corridor with upper gallery of Queen Margaret College, recto side of overall photograph. Photograph dated 1888.


Fig 3: Recto side of overall photograph showing the female presidents of Queen Margaret College pictured here inside the building with the coat of arms showing in the background. Photograph dated c.1948.

## Short History and Characteristics:

Gelatin silver prints were being made as early as 1874 on a commercial basis, yet in the beginning they were of poor quality and found under the form of a dry plate emulsion coated onto paper. The early gelatin silver papers also had no baryta layer. It was not until the 1890s that baryta coating became a commercial operation, first in Germany (1894), then Kodak (1900). A gelatin silver print is normally composed of four layers: *paper base*, *baryta*, *gelatin binder*, and a protective gelatine layer or *overcoat*.[2] The paper base or support serves as the substrate onto which the subsequent layers are attached. Baryta refers to a white coating made primarily from gelatin and barium sulphate. The purpose of the baryta layer is to cover the paper fibers and form a smooth surface upon which to coat the gelatin. Third layer is the gelatin binder that holds the silver grains of the photographic image. The fourth layer, called the overcoat, supercoat or topcoat is a very thin layer of hardened gelatin that is applied on top of the gelatin binder. This layer acts as a protective shield, providing superior abrasion resistance to the print surface.

Fig. 2a: Microscopic image showing texture and composition of paper support (taken in the light area of the left hand side of the photograph), approx. 19, 9 cm from bottom towards centre.

Fig. 2b: Microscopic image showing the different paper layers forming the cardboard support (taken in the yellowish-brown area of the right hand side of the photograph), approx. 17, 5 cm from bottom towards centre.

## Deterioration:

Direct sunlight, insects or rodents are some of the best known physical enemies of photographs. However, there are others, more subtle yet equally dangerous and easily overlooked, which can bring damage to photographic collections. Among these, adhesives degrade over time, sulfur compounds can be given off by wood or rubber and can trigger fading, and humidity, which can encourage mould growth. The gelatine binder and the paper support are both organic materials, and are susceptible to change and deterioration by exposure to water or high relative humidity. Deterioration can be divided into several broad categories: *image decay*, *gelatine binder* and *paper decay*, and finally *mechanical damage*. Photographs need to be kept in cool, moderately dry and perfectly inert environments in order to remain unchanged. For a typical gelatine silver print, image deterioration proceeds by exposure to pollutants in the presence of moisture and heat.[3] The basic mechanism of silver image decay is the same in every case: the silver particles that form the typical black-and-white image undergo changes in their shape and size, and may react with sulphur to form silver sulphide.

Fig 1a: Close-up of Fig 1, showing damage produced both to the gelatin layer in the upper left corner and also the cardboard support.

## Research Findings and Conclusion:

One of the most common forms of deterioration which directly affects photographic prints or paper in general are moulds. If a print were stored in conditions with a high level of humidity and temperature changes, it would be vulnerable to mould growth. Mould has a weakening effect on the gelatin, making it readily soluble in water. If prints that have been mould-damaged are exposed to water, the gelatin layer may dissolve or lift from the support, ultimately causing the complete loss of the image.[4] This can also occur when early gelatin silver prints with unhardened gelatin layers are exposed to water. Different types of lighting allow for the collection of evidence on how photographs have been made and how their condition has changed. Therefore, through a closer examination under the magnifying glass and UV lamp of all three images, various types of moulds were discovered on the verso side of *Fig. 1*. UV has also given a clearer idea of the overall damages present on the recto side of this image.

Fig 1b: Close-up of recto side of photograph (Fig.1) seen under UV light, showing area where the gelatin layer has been removed from the photographic paper. This area appears luminous almost in entirety, with some parts darker than others.

Fig 1c: Close -up verso side of photograph (Fig.1) seen under UV light, showing right hand side area where dormant fungi of a luminous colour are located, approx. 9, 4 cm in width.

**Acknowledgements:**
The present author would like to thank the two main supervisors, Mrs. Elzbieta Gorska-Wiklo and Dr. Mark Richter, for their continuous support and guidance throughout the journey of this internship, which was made possible through the collaboration between the College of Culture and Creative Arts, Department of History of Art and the Glasgow University Archive Services.

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