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 Also available in French at www.oldasiaphotography.com

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NINETEENTH CENTURY JAPANESE PHOTOGRAPHY: TECHNIQUES, CONSERVATION AND RESTORATION

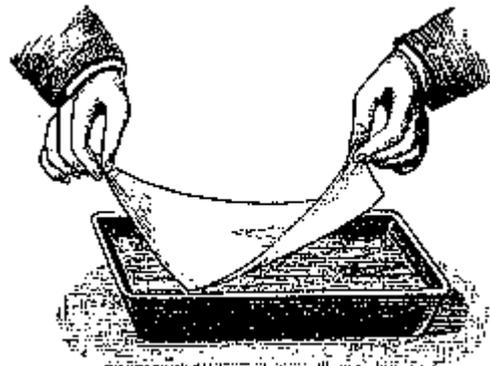
Introduction:

Most Japanese photographs printed on paper and held in collections today are albumen prints. We may sometimes find salt prints, but they are considerably rarer.

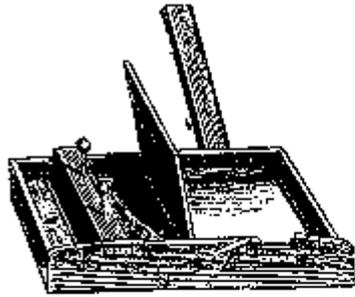
Albumen paper:

The technique of developing on albumen paper was discovered in 1850 by the French photographer Louis-Desire Blanquard Evrard. The process itself involves two layers: the protein emulsion, albumen, supported by the backing paper, invariably of very good quality, and quite fine.

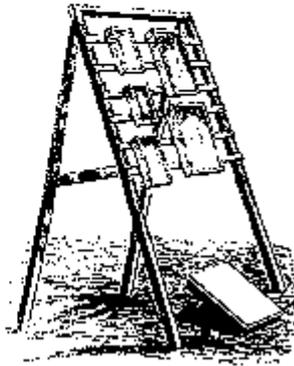
Albumen is prepared by beating the whites of eggs to which salt (sodium chloride or ammonia) has been added, then letting the mousse return to its liquid state. Sheets of paper are albumenised by being floated on top one at a time, and are then hung vertically to dry.



COATING PAPER BY FLOATING IT ON ALBUMEN SOLUTION.



The sheets of albumenised paper were thus sold and the photographer himself had to prepare them for photo-sensitivity. For this, the sheets were placed with the albumenised surface face down in a bath containing a 10% solution of silver nitrate. Combining with the salt already present in the albumen layer, the silver nitrate formed photo-sensitive silver-chloride. The paper prepared in this way could not be kept for very long, and so the sensitisation, the exposure and development often had to take place in the same day.

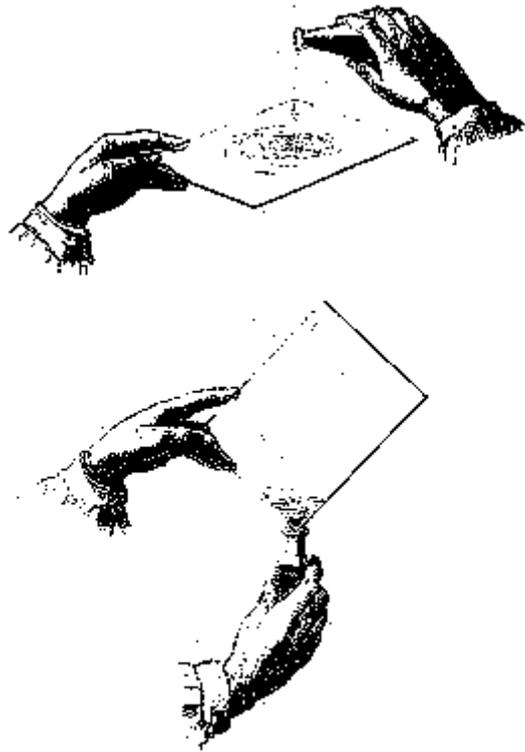


Exposure was done in a printing frame which held the negative in contact with the sensitised paper. Because of the low sensitivity of the paper at that time, a large amount of lighting was necessary, and exposure had to be done in sunlight, and enlargement as we know it today was seldom practised.

PRINTING FRAMES

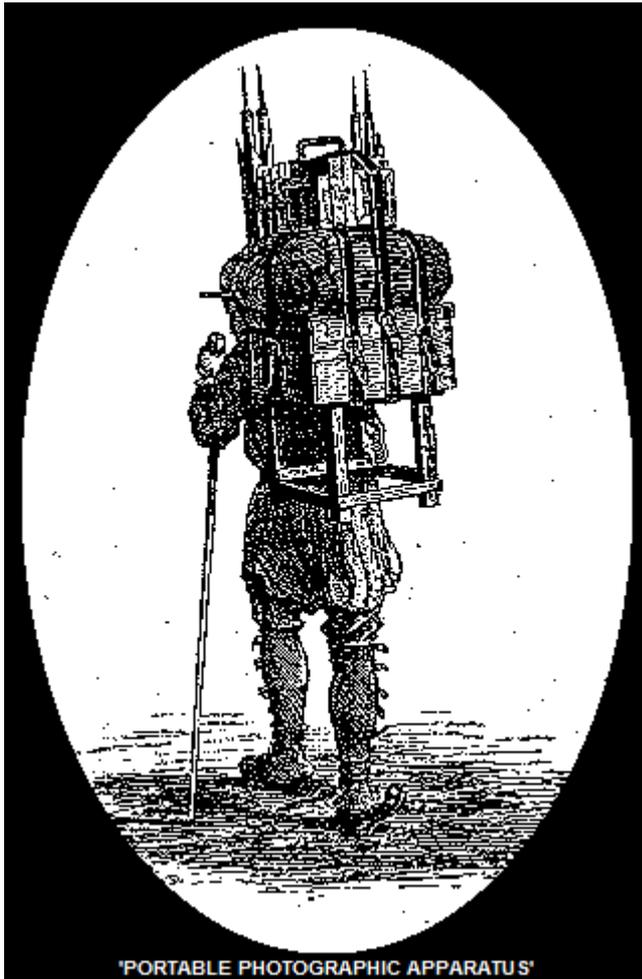
Collodion negatives:

The negatives were basically plates of glass treated with wet collodion, a process invented by Scott Archer in 1850, then with dry collodion, and finally gelatinised plates which appeared in Japan during the 1890s.



PREPARATION OF COLLODION GLASS PLATE NEGATIVE

The wet collodion process imposed numerous constraints on the photographer. The collodion had to be applied on to glass plates, sensitised immediately before the picture was taken and then developed immediately afterwards. This technique therefore required that, for each plate he took outdoors, the photographer had to carry all the necessary material and find an area sheltered from the light. To do this, when he could not retreat to an inn or a temple, the photographer often had to make do with a tent made of thick cloth. Since the range of equipment required was heavy and fragile, the plates and the glass chemical beakers were therefore placed in compartmentalised wooden crates. A porter was often necessary. Temperature was an equally important factor, and excessive heat often precluded good results.



Despite all these hindrances, the constraint of having to develop the exposed negatives immediately at least enabled the photographer to judge the results of his work, and to proceed with a further shoot if necessary, without having to undertake a second journey or reconstruct a scene. For this reason, the negatives of this time often show a high degree of technical accomplishment.

The advent of the dry collodion plate allowed photographers to prepare their plates in advance, and gave them greater freedom.

It is worth recalling that photographic collodion is a solution of celluloid nitrate in a mixture of ether and alcohol. It is a highly inflammable substance, and was perhaps the cause of fires such as that which destroyed the Yokohama studio of Felice Beato in 1865.

It is very likely that European photographers active in Japan imported most of their material from Europe. Basically, the photographers had great difficulty in procuring good quality chemicals in sufficient quantities and glass plates, which often arrived broken or damaged.

These products were only available either in Europe or sometimes Calcutta. The presence of the impression of the French paper maker B.F.K. Rives on many Japanese photographs would suggest the existence of a direct trade between Yokohama and France. It is equally possible that imported paper was albumenised beforehand by emulsifiers in Dresden. The paper made by Rives was in fact used almost exclusively in Germany as backing for the albumen layer, since it possessed all the necessary qualities of photographic paper.



ADVERTISEMENT FOR B.F.K. RIVES ALBUMEN PAPER

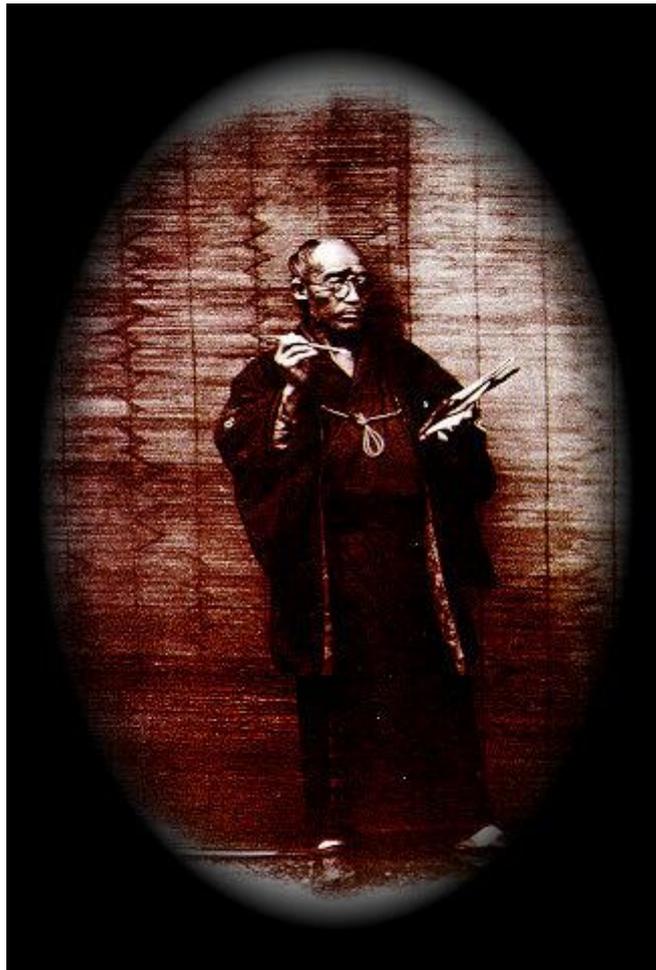
Mounting:

Most Japanese albumen prints have been mounted *en plein*, which is to say that the entire reverse surface has been pasted on card of more or less good quality. Albumenised paper has the peculiarity of rolling in on itself, since the albumen layer creates a tension which very fine paper

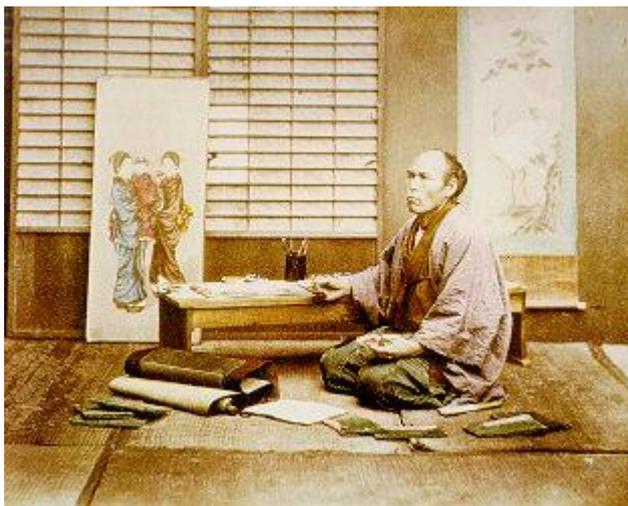
cannot withstand. As a result, very fragile photographs are difficult to unroll and display. Mounting in an album therefore presents numerous advantages, among which the print is preserved flat and the structure of the album protects the photographs from physical and climatic shock. However, we shall return to this later.

Colouring:

As you have seen in the exhibition accompanying this conference, many photographs were coloured. For centuries, Japanese artists were experienced in the meticulous work of applying colour. In fact, numerous prints were coloured by hand. As a result, there existed a strong local tradition and a remarkable level of accomplishment. In the middle of the nineteenth century the production of ukiyoe prints having declined somewhat, this would provide a talented workforce. Japanese artists knew perfectly well how to master wash drawing and transparency. Charles Wirgman was without doubt the first to attempt to apply tints of colour to the photographs of Felice Beato. Instead of the oil colours which he doubtless used in his own artistic work, he preferred to use transparent colours which he had discovered in Japanese traditional painting and prints. According to what we know today, it was Wirgman who, seeing the satisfactory results and the success of these painted images, persuaded his friend Felice Beato to employ a Japanese artist in their studio. In a gesture symbolic of the alliance between the new photographic technology of the West, and the ancestral artistic tradition of Japan, Beato later took the portrait of his artist, proof of the latter's importance within the studio and of the appreciation which the photographer had for his accomplishment and talent.



FELICE BEATO: 'OUR ARTIST'



As photography developed further, so the number of colourists in each studio increased and it would be wrong to associate one work with a single colourist. In 1891, the photographer Adolfo Farsari employed 19 colourists, while, five years later, the studio of Tamamura Kozaburo employed 105 assistants and colourists to fulfil a special order. The studios were truly picture factories.

Like any Japanese artist, the colourist would work on a flat surface, seated cross-legged or on his heels, knees pushed under a low wooden table where the images were placed, secured by a paper-weight (*bunchin*). Laid out on the table

were the brushes (*fude*), ink-stones and the bowls filled with freshly prepared colours.

In Japan, each artist bought his pigments and colours in powder form, in varying degrees of granulation, then after any necessary further grinding, the artist mixed each pigment which he intended to use with a small quantity of buckskin glue called *nikawa*, applied in a 2% solution. The mixing was always done with the finger, usually the index finger, taking due care if the pigments were toxic, such as the yellow orpiment, or King's Yellow (arsenic trisulfide), which forms the basis of arsenic or the vermilion composed of mercuric sulphur. A small porcelain bowl, *ezara*, was reserved for each colour, the gradation of each tone being done afterwards in a sectioned dish known as the 'plum flower dish' *oromezara*.



A prepared colour did not last very long, especially in summer when the heat would cause the binding agent to lose its adhesiveness. In photograph studios, where consumption was heavy, the preparation of colours took place almost every day. The painter had to determine precisely the quantities of pigment and fixative, as well as their concentration. Too weak a solution could give the colour a yellow hue and create tensions when the colour dried, while the reverse would result in a lack of adhesion in the pigment. Once the preparation was complete, the colour was left to dry before being used for the first time. Certain colours such as indigo (*ai - polygonum tinctorius*) were sold in the form of sticks (*enogu*) which had already been mixed with *nikawa* glue. The artist then rubbed the dried colour on an ink stone (*suzuri*) with a little water in the same way as Chinese ink (*sumi*).



On coloured photographs, we usually find indigo and Prussian blue comprising the blue palate, gamboge (*shiô - garcinia morcella*) the yellow, and vermilion or cinnabar (*mercuric sulfide*) red and orange-red, but also safflower (*beni - carthamus tinctorius*) for the latter, and Tokyo violet (*murasaki - lithospermum erythrorhizon*) the violet. These are basically the organic pigments traditionally used in Japan and are very sensitive to light.

If certain colours appear to us today as loud or crude, there are two reasons for this. Firstly, from the 1880s and 1890s very vivid aniline colours came into use, which contrasted with the softness of natural pigments and albumen. Furthermore, the decrease in density of the silver image, which, becoming more faded than it did originally, brings out the colours.

Chemical degradation.

Decrease in density and yellowing are the principal chemical alterations which we can find with albumen prints. These degradations are mainly caused by the attack of sulphur constituents. When

combining with sulphur, the black silver grains in the image change into silver sulphate of a light yellow tint, which involves progressive loss of the image. This is irreversible. The sulphur can originate in the fixative bath, when the washing of the image has not been sufficient, and the image can appear to us today as uniformly pale.

However, the penetration of air is without doubt one of the main causes of alteration. This is particularly visible where Japanese photographs have been kept in an album unprotected by a box, where the pages have buckled.

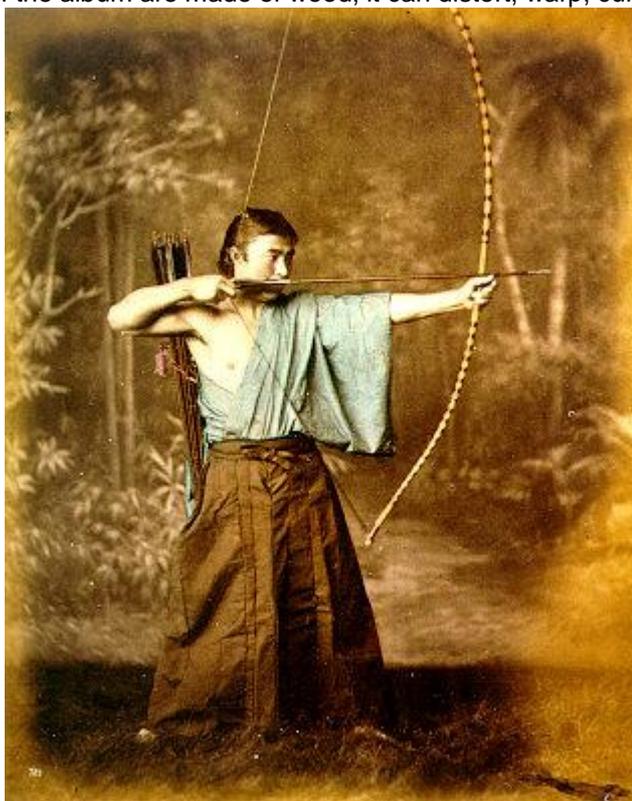


The gaps caused by the distortion of the pages have allowed air, pollutant gasses and dust to enter. If, as is sometimes the case in Japan, the photographs have been pasted to the mount with animal glue, it can equally attack the silver in the print and cause a decolouration which is marked by bands of yellowing. As I have already mentioned, these chemical degradations are irreversible because they occur in the molecular structure of the silver print. On the other hand, we know that these degradations are greatly accelerated by humidity and heat, which act as catalysts in this reaction. Thus, we can hold back the process of degradation and effectively preserve the photographs while protecting them in boxes by placing them in an environment where the temperature and humidity can be controlled.



The stability of thermo-hygrometric conditions is a very important factor. With regard to the binding, if it contains leather, air which is too dry will cause a drying up which is often irreversible and result in it breaking when handled; if the boards of the album are made of wood, it can distort, warp, curl in on itself, and, in the case of accordion-style albums, can break the hinges.

We have even seen a case where the wood has become so warped that the photograph pasted on the reverse has split under the tension. Very humid air and high temperature will encourage the development of mould and foxing, brownish stains which are very often encountered on card and paper but equally on photographs. If a photograph is placed next to wood, very high humidity can result in tannins affecting the paper and the images, resulting in stains. The stability of the conditions of conservation is important since the flow of humid air onto dry air will cause the buckling of album pages and the appearance of cracks on the surface of albumen prints. The conservation of albums and photographs in good condition is therefore very important from the point of view of preventing these degradations. We therefore recommend conserving photographic work at $18^{\circ}\text{C} \pm 1^{\circ}\text{C}$ at a relative humidity of between 40 and 60%.



Archival boxes should not contain lignin which, as it ages, causes acidity in the card, while any material containing chlorine or sulphur is to be avoided. Furniture should preferably be made of either metal or old wood, but not fibreboard or other reconstituted woods since the glue they contain causes oxidation. The images, and tinted photographs in particular, should be protected as much as possible from sunlight since it causes yellowing of the albumen, as well as the weakening of organic pigments, deterioration of the supporting paper and acceleration of the chemical reactions leading to degradation.

Restoration:

Many photographs suffer physical damage, which, in most cases, is due to poor handling, but can also be caused by attempts by the amateur to repair it himself. Photographs may also have suffered accident, such as water damage or the effects of a fire.

The restoration of a photograph and its supporting paper cannot be dealt here in detail, but a few examples may be given.

The restorer can take action in removing the causes of alteration to the photograph, for example by means of a piece of archival tape to hold a tear, which, if it has yellowed, will become sticky and seep into the paper or even worse the emulsion of the photograph. The mount of a photograph can equally damage the image when it is of very poor quality, acidic and brittle. The photograph should then be separated from its mount and placed in a new, better quality mount. The folds can be taken out. Tears can be repositioned. If a photograph or a mount is in need of conservation, and has a missing piece, a new one can be made and incorporated. This year I have also been able to perfect a method which allows one to restore the flatness of pages in an album with tinted photographs pasted on both sides. As a general rule, restoration permits photographic material to regain some of its sharpness and physical coherence.

Each action is specific, and each image presents its own particular problems. It is therefore important to call upon professional restorers who have received training based on a complete knowledge of both the processes and materials involved, as well as a professional code of practice.

Photographs have left us a fragile legacy, and we must preserve it with the greatest care.

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Recommended conservation conditions for 19th-Century Photographic Prints.

Relative Humidity: 30-40%

Temperature: $18 \pm 1^{\circ}\text{C}$

Air Filtration for Particles

Air Purification to Remove Oxidant and Sulphurant gasses

Lignin and Acid Free Cellulose Materials

Use only Cellulose Triacetate, Polyester (Polyethylene Terephthalate) and Polyethylene Plastics - no PVC (Polyvinyl Chloride) or any Materials containing Chlorine or Sulphur.

Photochemical Damage to Hand-coloured Albumen Prints

Yellowing of the Albumen Protein

Embrittling of the Cellulose

Fading of Organic Pigments

Degradation of Lignin producing Substances which Stain Prints and Attack Silver Images

Acceleration of Chemical Reactions

Recommended Lighting Conditions for the Display of Japanese 19th-Century Albumen Prints

Always use lights with UV Filter

Protect against Sunlight

Light Level: 50 Lux (5 foot-candles)

Exhibition time not to exceed 250 hours.