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Topics in Photographic Preservation, Volume 15.
Pages: 27-33
Compiler: Jessica Keister

Topics in Photographic Preservation is published biannually by the Photographic Materials Group (PMG) of the American Institute for Conservation of Historic & Artistic Works (AIC). A membership benefit of the Photographic Materials Group, *Topics in Photographic Preservation* is primarily comprised of papers presented at PMG meetings and is intended to inform and educate conservation-related disciplines.

An Initial Investigation into Japine: William Willis's Proprietary Paper

Constance McCabe, Matthew L. Clarke, Christopher A. Maines, Lisa Barro, Silvia A. Centeno, and Anna Vila

Presented at the PMG session of the 2012 AIC Annual Meeting in Albuquerque, New Mexico.

Introduction

Surface character strongly influences the appearance of a photograph. The surface sheen of the various print types may be altered by physical and mechanical means, such as coating, burnishing, or ferrotyping. Photographic paper manufacturers went to great lengths to achieve particular surface characteristics, such as by adding matting agents to binders and imparting a regular texture in the baryta layer. The Platinotype Company of London used a less-familiar means to alter the surface of its photographic paper product line known as "Japine" (fig. 1).

What the *Morning Post* says about

JAPINE PLATINOTYPE.

Probably the 1906 Convention will be best remembered as the occasion when the new Platinotype paper known as "Japine" was introduced to the photographic world. The paper in question provides what many amateurs have been intensely longing for, *i.e.*, a sepia brown Platinum print, which, instead of having a dull surface, should possess the half glossy "egg shell" surface met with in some carbon prints. Platinotype workers have often wished that the same effect which was apparent as the wet print lay in the developer could be retained by the dry print. This, in a large measure, is what the Japine paper effects, the shadows being not dull, but rich and lustrous. Moreover, the range of gradation has been considerably augmented, as I have been able to assure myself by a careful comparison of prints taken on the old and the new papers. When it is added that the printing latitude of Japine is twice as great as that of ordinary Platinotype, and that its damp-resisting power is tenfold as great, it will be realised that there is likely to be a considerable popularity for this notable improvement of variation in Platinotype printing.

Sold in Semi-matt or Glossy Surfaces, at same prices as our ordinary papers.

HOT OR COLD DEVELOPMENT.

THE PLATINOTYPE COMPANY,

22, BLOOMSBURY STREET, LONDON, W.C.

PLEASE MENTION THIS JOURNAL WHEN CORRESPONDING WITH ADVERTISERS.

Fig.1 Early advertisement for Japine.
The Amateur Photographer, August 21, 1906, p. xiv.

Conjecture in recent years regarding the chemical nature of Japine paper, which assumed the presence of a gelatin layer, led the authors to the present investigation. The literature of the period and supporting chemical analyses provide evidence that Japine was prepared by altering the surface character of plain paper using chemical modification.

Background

In 1906, the Platinotype Company of London introduced the Japine Platinotype, which boasted a surface sheen unlike that of ordinary, plain-paper platinum prints. Until then, the company's Platinotype papers were designated by the paper color (white or cream), paper texture (smooth or rough), thickness of the paper stock (lightweight or heavyweight), and image color (sepia or black). With Japine Platinotype's introduction the Platinotype Co. began to describe the surface sheen of its photographic papers (Platinotype Company 1906).

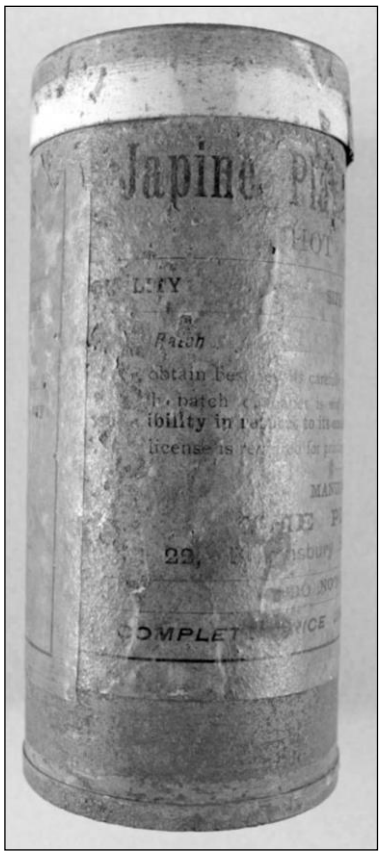


Fig. 2. Undated tin of Japine Platinotype for Sepia Tones, The Platinotype Co., London. Courtesy Photograph Conservation Study Collection, The Metropolitan Museum of Art.

The term "Japine" described a range of surface qualities of the paper, which included "half glossy," "eggshell," "semi-matt," "glossy," (see fig. 1) "matt" and "glazed" (Platinotype Company 1906). Japine was prized for its "rich and lustrous" wet-print appearance (Japine Platinotype 1906) "rich and luminous shadows" (Kimber 1907), superior wet strength in warm water and resistance to abrasion (Smith 1915), and its hard surface that lent itself to coloring (Brown 1916). The period literature describes Japine as free of gelatin (Smith 1915), "having a semi-matt surface that is not an applied coating but is integral with the paper" (Salt 1929), and providing "maximum detail and shadow transparency" (Wheeler 1930).

Few identified examples of photographs printed on Japine papers have been found, and only one sample of unprocessed sensitized Japine Platinotype paper, still in its sealed original container, has been discovered (fig. 2). Several platinum prints by Paul Strand in the collection of the Museum of Modern Art, New York, have been cataloged as "Japine," and Alfred Stieglitz mentions Japine in his correspondence with Strand. Visual examination of the paper sample and photographic prints provides clues to the physical nature of Japine. But with so few known examples available for study, the authors turned to the period literature and chemical analyses to better characterize Japine.

Willis's Japine Products and Satista Patent

William Willis first introduced his Japine Platinotype in 1906 and ceased production in 1937 (Robinson to Scott 1937). However, few hints regarding the production of Japine were revealed until the publication of his 1913 Satista patent, which includes the following statement (Willis 1913):

> I have further found that particularly advantageous results can be obtained in the above process by using paper the surface of which has been parchmentised by treatment with acid or by other well known means. The paper is coated or treated on each side with sulphuric acid sufficiently strong to attack the paper; the paper is well washed in water to free it from acid and is then dried. The acid is not left on long enough to penetrate the paper, the aim being to get a film of altered paper on each side.

Parchmentized paper, or vegetable parchment, is a cellulose-based paper that has been chemically modified by immersion in sulfuric acid. Vegetable parchment mimics animal

parchment or vellum, and can be chemically modified throughout the sheet, or the process can be modified to achieve partial parchmentization, depending on the desired properties of the end product. Thoroughly parchmentized paper continues to be manufactured today for use as baking paper and to wrap cheese and meat due to its desired properties of mechanical strength and resistance to heat, moisture, and oils. Superficially parchmentized paper provides a more opaque and reflective surface for such products as writing and printing papers, and may have been a viable alternative to plain paper for use as a photographic support (Jenkins,1992).

In 1914 Willis's patent for his silver-platinum "Satista" process was accepted and, in the same year, the Platinotype Co. began marketing its Satista paper (Willis & Clements 1914 and Notes and Comment 1914), the earliest of which was prepared on Japine paper (Our Roving Commissioner 1915). The Platinotype Co. introduced Japine Silver in 1916 (Photo-Miniature 1916), and Palladiotype in 1917 (Palladiotype 1917). The earliest Palladiotype paper was described as having a "vellum-like" surface, which was likely due to the Japine paper substrate.

Vegetable Parchment and Japine

Was Willis's Japine paper produced by parchmentization with sulfuric acid? To answer this question the authors compared the single historic sensitized Japine Platinotype with other historic plain-paper samples of sensitized platinum paper and photographs.

The sensitized and unprocessed Japine sample is undated, and no designation of sheen is mentioned on the container's label, but the sample is much glossier than plain, unmodified paper. Platinum and palladium prints by Alfred Stieglitz and Paul Strand in the collections of the National Gallery of Art, The Metropolitan Museum of Art, and the Museum of Modern Art were studied for clues regarding their surface. A number of these prints displayed a surface sheen that appears similar to that of albumen prints: under magnification, paper fibers are visible through the uppermost "crust" in the low-density image areas. The historic Japine sample displays a similar surface layer.

Analyses of Platinotype Co. Platinum Papers

Scientists from the National Gallery of Art (NGA) and The Metropolitan Museum of Art (MMA) studied the undated sensitized Japine Platinotype paper sample to detect and identify any proteins, resins, and carbohydrates present. In-depth analyses of these scientific investigations and reverse engineering experiments will be published separately. However, the findings are briefly presented here. The instrumental techniques used included**:**

- Py-GCMS (pyrolysis gas chromatography-mass spectrometry, NGA)
- GCMS (gas chromatography-mass spectrometry, NGA)
- ATR-FTIR (attenuated total reflectance-Fourier transform infrared spectroscopy, NGA and MMA)
- Transmission FTIR (MMA)
- ELISA (enzyme-linked immunosorbent assay, MMA)
- Raman spectroscopy (MMA)
- SEM-EDX (scanning electron microscopy-energy dispersive X-ray spectroscopy, NGA)
- XRF (X-ray fluorescence spectrometry, NGA and MMA)

ATR-FTIR indicated that the Japine surface consisted of modified cellulose consistent with parchmentization by sulfuric acid, and did not detect protein spectral signatures. Further, the results of ELISA experiments performed to screen the Japine sample for collagen I, ovoalbumin, and gums were negative, indicating that no gelatin or any other collagen I protein, albumen, or gums were present. Raman spectroscopy indicated that the Japine surface contains amorphous cellulose, also consistent with the acid treatment of the parchmentization process. Rosin was identified with Py-GCMS**,** but was associated with the alum-rosin sizing of the paper. Carbohydrate analyses of the paper surface and base by GCMS found in each case only the monosaccharide glucose, the subunit of cellulose. This indicates that the Japine surface is composed of cellulose and/or cellulose esters. These findings support the hypothesis that Willis's Japine paper is a form of vegetable parchment.

Reverse Engineering of Parchment Paper for Platinum Prints

A ca. 1980 Crane & Co. alum-rosin sized 100% cotton paper, without alkaline buffers or optical brightening agents, was subjected to parchmentization tests. This paper was chosen because it is similar to the paper base of the historic sensitized paper. Both the untreated and parchmentized Crane & Co. papers were then sensitized and processed, yielding platinum prints of good quality, demonstrating that parchmentized paper was suitable for use as a platinum paper.

SEM Images of Platinotype Papers

Two of the Platinotype Company's undated sensitized but unprocessed platinum papers were imaged with SEM and compared, which revealed striking differences. The SEM image of a Platinotype KK (an alpha designation that indicated a heavy smooth paper with an unmodified surface) sample exhibits the characteristic appearance of an unmodified paper, its fibers distributed evenly throughout the cross-section (Willis & Clements 1908). A clearly visible surface film or "crust" is apparent in the Japine sample (fig. 3). This surface layer is consistent with the amorphous cellulose detected by Raman and ATR-FTIR.

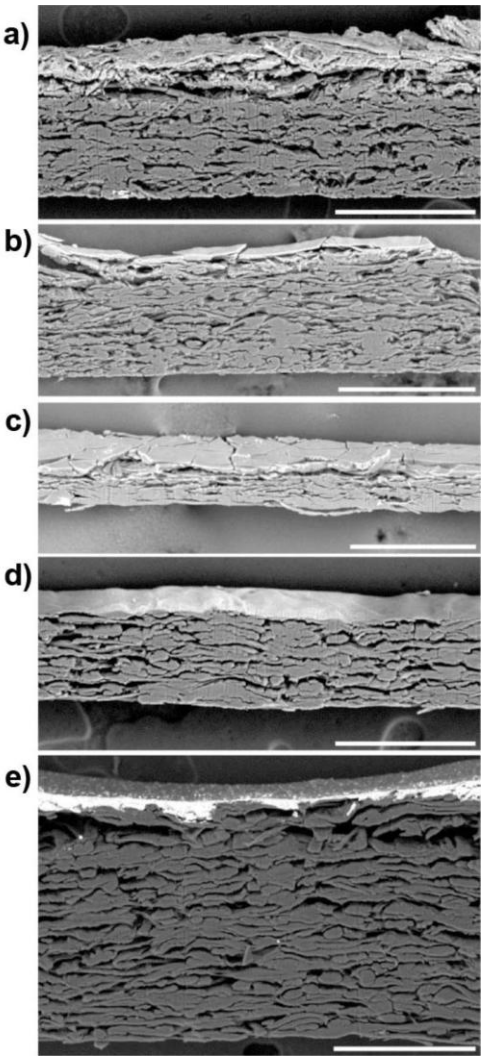
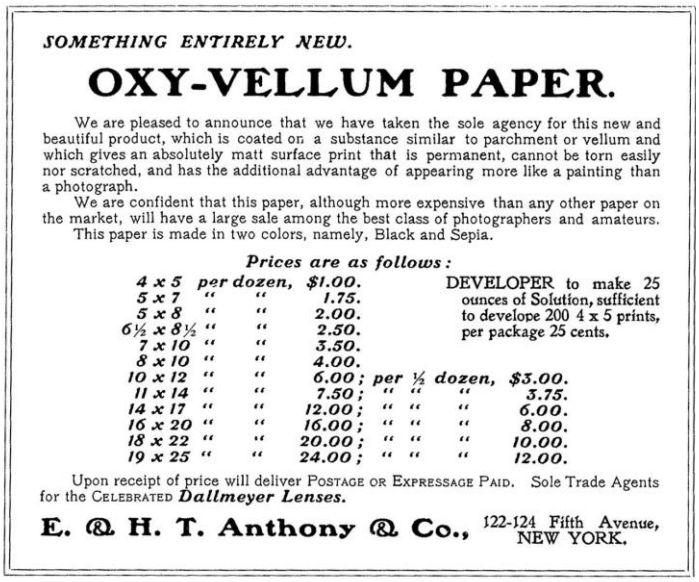


Fig. 3. SEM images of photographic paper cross-sections with different print layer structures. Samples are angled to facilitate viewing of the top surface. The scale bar is 200 µm.
a) Platinotype KK paper exhibits a single-layer structure while b) Japine Platinotype has one layer with a chemically modified surface. Two-layered structures are observed in c) an albumen print and d) a silver gelatin print without a baryta layer. Finally, a three-layered print is illustrated in e) a silver gelatin print containing a baryta layer.

It is possible that Willis was not the first to use vegetable parchment as a support for sensitized photographic paper. A photographic paper called "OXY-VELLUM" was advertised in 1901 as a product "coated on a substance similar to parchment or vellum" and may have been a precursor to Japine (E. & H.T. Anthony & Co. 1901) (fig. 4). Knowledge that such modified surfaces exist will challenge efforts to identify photographic processes. It is possible that some papers that have been assumed to be silver gelatin without a baryta layer may be silver or platinum prints on parchmentized paper.



SOMETHING ENTIRELY NEW.

OXY-VELLUM PAPER.

We are pleased to announce that we have taken the sole agency for this new and beautiful product, which is coated on a substance similar to parchment or vellum and which gives an absolutely matt surface print that is permanent, cannot be torn easily nor scratched, and has the additional advantage of appearing more like a painting than a photograph.

We are confident that this paper, although more expensive than any other paper on the market, will have a large sale among the best class of photographers and amateurs.

This paper is made in two colors, namely, Black and Sepia.

Prices are as follows:

4 x 5	per dozen,	$1.00.				
5 x 7	" "	1.75.				
5 x 8	" "	2.00.				
6½ x 8½	" "	2.50.				
7 x 10	" "	3.50.				
8 x 10	" "	4.00.				
10 x 12	" "	6.00;	per ½ dozen,			$3.00.
11 x 14	" "	7.50;	" "	"		3.75.
14 x 17	" "	12.00;	" "	"		6.00.
16 x 20	" "	16.00;	" "	"		8.00.
18 x 22	" "	20.00;	" "	"		10.00.
19 x 25	" "	24.00;	" "	"		12.00.

DEVELOPER to make 25 ounces of Solution, sufficient to develope 200 4 x 5 prints, per package 25 cents.

Upon receipt of price will deliver POSTAGE OR EXPRESSAGE PAID. Sole Trade Agents for the CELEBRATED *Dallmeyer Lenses.*

E. & H. T. Anthony & Co., 122-124 Fifth Avenue, NEW YORK.

Fig. 4. E. & H.T. Anthony & Co. 1901. OXY-VELLUM Paper advertisement. *Camera Notes* 5(1).

This study demonstrates that parchmentized papers were used for sensitized commercial photographic papers, and adds to the familiar structure descriptions of photographic prints. In addition to the familiar one-, two-, and three-layered structures of photographic prints, the authors propose the new category of "one layer with modified surface."

Conclusion and Future Work

The semi-gloss surface of some "Japine" prints can lead even the most experienced connoisseurs of historic photographic prints to mistake them for two-layer prints or plain-paper prints with applied coatings. The fact that Japine has been described as having a surface sheen that ranges from "matt" to "glazed," and has been used for platinum, silver-platinum, silver, and palladium papers further complicates characterization. The dearth of identified samples makes it extremely difficult for modern observers to comprehend what constitutes a Japine print. Evidence exists that manufacturers other than the Platinotype Co. may have offered photographic papers on parchmentized paper supports, causing additional confusion regarding proper categorization of print types. Understanding the physical and chemical nature of the subtle qualities of these photographs is fundamental to the aesthetic appreciation and identification of photographic prints, and will suggest insights for their preservation and conservation treatment.

The authors' work on the subject of the Platinotype Company's Japine papers continues. The study includes the ongoing search of identified samples of Japine papers and prints, visual examination of collection prints, and chemical analyses, and physical measurements of a variety of samples. This research will be presented at the October 2014 Platinum and Palladium Photography symposium in Washington, DC, and an in-depth paper will be published following the symposium.

Acknowledgments
The authors are grateful to Hae Young Lee (formerly a Postdoctoral Fellow at the MMA) and Julie Arslanoglu (Associate Research Scientist at the MMA) for conducting the ELISA analysis. The authors thank Mike Ware for his research support over the years, printing many platinum samples, and providing the sample tin of Platinotype KK. A very special thank-you is given to Laura Harris, former Associate Museum Librarian, Joyce F. Menschel Photography Library, for finding the Japine paper tin. Many thanks are due to Mervin Richard, Sarah Wagner, Alisha Chipman, Marian Dirda, and Andrea Nelson at the National Gallery of Art, and Nora W. Kennedy and Katherine Sanderson at The Metropolitan Museum of Art. This work was supported by grants from Annette de la Renta and The Andrew W. Mellon Foundation, for which the authors owe a special debt of gratitude.

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Further Reading

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