The Atlas of Analytical Signatures of Photographic Processes

WOODBURYTYPE

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The Atlas of Analytical Signatures of Photographic Processes is intended for practicing photograph conservators and curators of collections who may need to identify more unusual photographs. The *Atlas* also aids individuals studying a photographer's darkroom techniques or changes in these techniques brought on by new or different photographic technologies or by the outside influence of other photographers. For a complete list of photographic processes available as part of the *Atlas* and for more information on the Getty Conservation Institute's research on the conservation of photographic materials, visit the GCI's website at getty.edu/conservation.

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Front cover: Walter Woodbury, *Treasure Spots of the World*, 1875. Woodburytype print.

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WOODBURYTYPE

English: Woodburytype, photorelief printing, Woodbury's process,
relievo printing
French: *photoglyptie*
German: Woodburydruck

HISTORICAL BACKGROUND

The Woodburytype process was invented by Walter Bentley Woodbury (British, 1834–1885) / Joseph Wilson Swan (British, 1828–1914). Patented 1864, working details published 1865. The Woodburytype process was one of the first successful photomechanical processes fully able to reproduce the delicate halftones of photographs. It was often considered the most perfect, most beautiful photomechanical process and inspired a number of books, magazines, and special-edition printings between 1864 and 1910. When attempts were made to adopt Woodburytype to rotary printing, the process could not compete with the quickly developing collotype and halftone photomechanical processes that almost completely replaced Woodburytype by the end of the nineteenth century.

Like many practical inventions, the Woodburytype process is based on a number of previous discoveries and processes. The process utilizes the photosensitivity of dichromate-containing organic colloids, discovered by Mungo Ponton (1839). The photochemical formation of the gelatin relief dates back to the first carbon printing patent of Alphonse-Louis Poitevin (1855). The idea of washing unhardened gelatin from the lower part of an exposed gelatin layer comes both from the early experiments of Adolphe Fargier (1861) and from the development of Joseph Wilson Swan's fully practical carbon-transfer process (1864). The idea of creating a metal mold out of gelatin relief using both lead plate and electrotyping has its roots in nature printing, which was fully developed and patented by Alois Auer in Austria (1852).

It is also not unusual that the priority of "photorelief printing" was highly contested by both Walter Bentley Woodbury and Joseph Wilson Swan, who developed and patented two almost identical photomechanical processes (1864–65).

Regardless of the fact that many historical findings speak to Swan's priority of original ideas of the photorelief process introduced under the name *photo-mezzotint*, it was Woodbury who advanced his research ideas into a fully workable and practical method of photomechanical printing of continuous-tone photographs. Woodbury's patents in England, France, Belgium, and the United States, as well as production of several Woodburytype process printing establishments in England, France, and the US, were responsible for the printing of hundreds of thousands of Woodburytype

Figure 1 Walter Woodbury, *River Scene, Java.* From *Treasure Spots of the World*, 1875. Woodburytype print.

photographs that provided book and magazine illustrations, short-run advertisement material, and promotional material. A number of Woodburytype images were also printed for sale as individual images or as *cartes-de-visite* (CDV) or cabinet cards (CC).

One of Walter Woodbury's prints is shown in figure 1.

Woodbury himself and a number of other researchers continued to improve various practical aspects of the Woodburytype process. Several important variants of the Woodburytype process were also developed and used on a very limited scale. Figure 2 shows a historical timeline for the Woodburytype process.

The Woodburytype process was a unique photomechanical process as it was the only practical fully continuous-tone photomechanical process ever invented. Woodburytype prints made using only carbon black or other stable inorganic pigments as imaging material are superbly stable from light fading. The stability of the gelatin binder might be compromised at higher temperatures and humidity due to biological deterioration. A number of Woodburytype prints were surface coated using collodion or other organic varnishes and coatings.

The majority of Woodburytype prints are easy to identify because the process was clearly described in print in books and on many prints sold commercially. Those that are described as "permanent prints" or not described at all, however, can be difficult to identify correctly even when using highly sophisticated analytical methods.

Process Description

The most widely used version of the Woodburytype process can be conveniently separated into several distinct procedures:

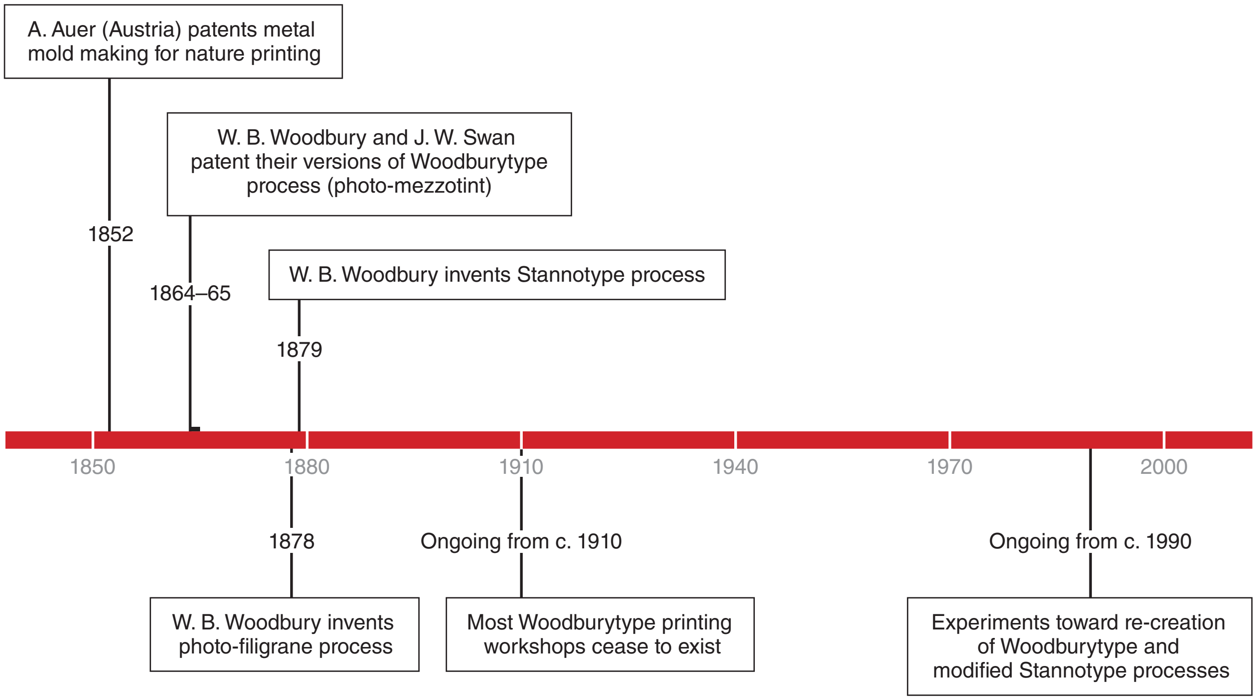

Figure 2 Timeline of the Woodburytype process and process variants.

1. A solution of gelatin, albumen, sugar, and ammonium dichromate is poured onto a polished glass substrate to form a layer about one-eighth of an inch thick.
2. After setting, the layer of chromatized gelatin is stripped off the glass substrate and dried in a desiccating box.
3. A glass negative is placed down, with the emulsion layer in contact with the chromatized gelatin slab that was originally attached to the glass substrate.
4. The negative-gelatin sandwich is placed into a copy frame and exposed to sunlight, with the negative side facing the sun (typical reported exposure time is up to 60 minutes).
5. Any gelatin not fully hardened by light exposure is washed away in a bath of hot water, forming a positive gelatin relief matrix that is thickest in areas exposed under the lightest areas of the negative and thinnest in areas exposed under the darkest areas of the negative.
6. The gelatin relief matrix is fully dried in a desiccator box. The fully dried gelatin relief matrix is fragile but very hard.
7. A high-power hydraulic press (35 MPa) is used to press the gelatin matrix into a smooth, perfectly leveled plate of lead, forming a negative lead matrix. The lead matrix is deepest in areas corresponding to lightest areas of the original negative and shallowest in areas corresponding to the darkest areas of the negative.
8. The lightly greased lead matrix is inserted into a Woodburytype printing press and filled level with hot, gelatin-based, pigmented ink. (The ink usually was made of gelatin mixed with carbon-based [lamp or vine-black] pigments. A good-quality india ink was used to produce black images. Woodburytype images were often printed in dark-brown, brown,

or purple-brown colors resembling gold-toned albumen photographs in which black was mixed with red and sometimes blue pigments.)

9. A specially prepared Woodburytype “receiving” paper (heavily gelatin sized or shellac varnished and calendered) slightly bigger than the lead matrix is placed on an ink-filled lead matrix and pressed down in the press.
10. After allowing 5 minutes to cool, set, and solidify the ink, the press is opened and the printed image is removed from the matrix.
11. Paper borders smeared with overflowing ink are cut off. The final Woodburytype print is ready to be mounted in a book or magazine page or on a final card stock.

Figure 3 shows a schematic cross section of a typical Woodburytype print.

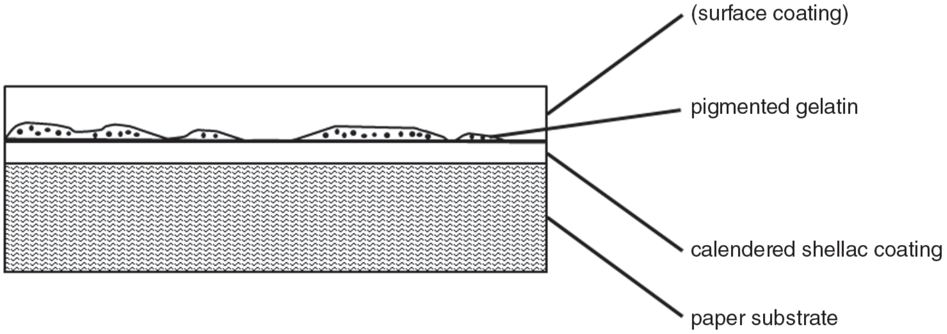

Figure 3 Schematic cross section of a typical Woodburytype print.

Main Application of the Woodburytype Process

The main applications of the Woodburytype process were the production of medium-size printing runs from camera negatives, the production of “permanent photographs,” and book, magazine, special purpose, and advertisement printing.

Noted Publications Containing Woodburytype Prints

Galerie Contemporaine (1876–84)
Street Life of London (1877–78), John Thomson
The Theatre (1878–97)
Treasure Spots of the World (1875), W. B. Woodbury
Trésor Artistique de la France (1872–75)

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Leyshon, W. E. 2012. *Photographs from the 19th Century: A Process Identification Guide.* Prescott, AZ: Sharlot Hall Museum Archives, 42–44, 106–7. Accessed March 26, 2013. http://www.sharlot.org/archives/photographs/19th/book/index.html

Most Important Woodburytype Patents

Walter Woodbury, English Patent 2,338 (Sep. 23, 1864)
Walter Woodbury, English Patent 105 (Jan. 12, 1866)
Walter Woodbury, English Patent 505 (Feb. 11, 1866)
Walter Woodbury, English Patent 1,315 (May 8, 1866)
Walter Woodbury, English Patent 1,918 (July 24, 1866)
Walter Woodbury, English Patent 3,654 (Dec. 4, 1872)
Walter Woodbury, English Patent 1,954 (May 30, 1873)

IDENTIFICATION: WOODBURYTYPES

Visual Signatures

Visual Characteristics

Woodburytype prints are difficult to differentiate from carbon prints, which share similar visual, microscopic, and analytical characteristics. Both size and application of both types of photographs can aid in their differentiation. Woodburytypes were usually printed in small formats, and any image larger than 11 × 14 inches would be a carbon print or possibly a Stannotype (a Woodburytype variant). Images larger than 8 × 10 inches might also be carbon prints, but we know that Woodburytypes of that size were seldom produced. Woodburytypes can also be found as illustrations in books, magazines, theater programs, and advertisement material. Many printed Woodburytypes were also identified as such in small print under the image (fig. 4).

Woodburytypes are also trimmed flush to remove the margin smeared by excess gelatin ink during printing. (Several patents were issued for improvements of the process that would allow for printing clear margins around the image, but most Woodburytypes ever produced needed to be cut on all four sides.)

Both Woodburytypes and carbon prints do not show any signs of image fading or silver mirroring. The color of both types of photographs can range from black to brown and purple-brown, and

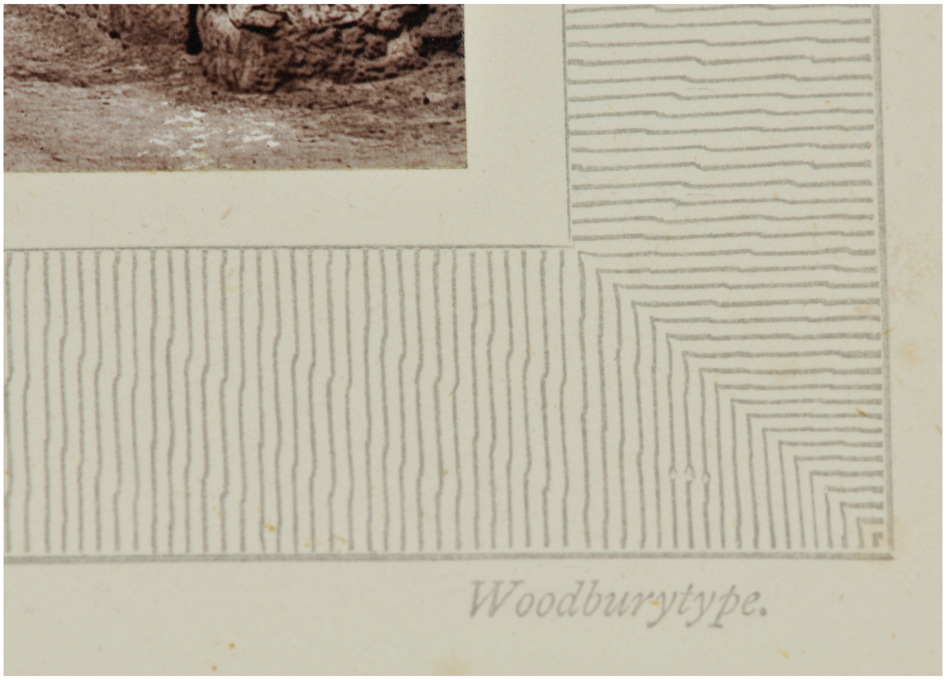


Figure 4 Small print identifying a print as a Woodburytype.

in certain cases pigments of different colors were used. Both types of photographs also exhibit slight surface relief that is most pronounced when observing the sharp boundary between light and dark areas of the image under raking light.

Microscopic Characteristics

To the naked eye, the Woodburytype image of Queen Victoria in figure 5 appears to be a perfect continuous-tone image. Observed under higher magnification (>25×) using a microscope or stereomicroscope, the most important characteristics of Woodburytype and carbon prints are the presence of randomly distributed microparticles of pigment and the presence, under careful inspection, of larger pigment clusters (figs. 6a, 6b). These clusters could not be fully eliminated and are important microscopic signatures of both Woodburytypes and carbon prints.

A Woodburytype image of the French actress Sarah Bernhardt is shown in figure 7a. A microscopic detail of figure 7a recorded in the Dmin area of the white dress she wears allows the observation of the fine detail of the paper fibers of the Woodburytype substrate (fig. 7b).

In the case of most typical brown-purple Woodburytypes (fig. 8a), the gelatinous ink contains small numbers of red or pink and sometimes blue particles, causing the prints to resemble toned albumen prints. These particles are usually detected when carefully observing a Woodburytype print under higher magnification (40×–80×) in the lighter part of the image (fig. 8b).

Sometimes edges or corners of Woodburytype prints exhibit a partial lift and cracking of the pigmented gelatin layer, which can ultimately lead to image layer damage (fig. 9).

Most Woodburytype images show good light and environmental stability, but because they are more than a hundred years old, some may suffer from cracking and lifting of the gelatin layer inside the image area (fig. 10).

Figure 5 A Woodburytype of Queen Victoria, 1890s.

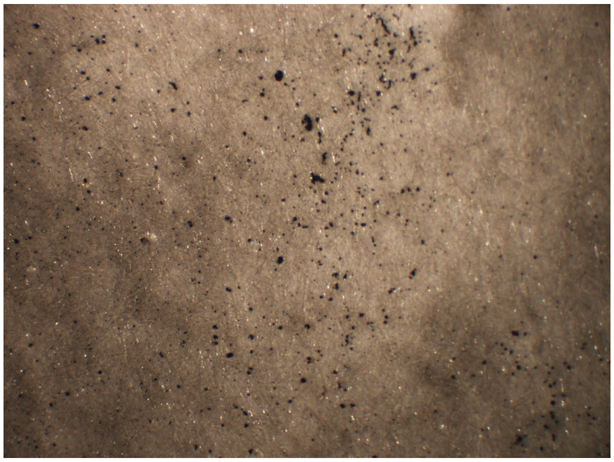


Figure 6a Detail of the print in fig. 5 (40× magnification), showing a very high concentration of pigment particle clusters.

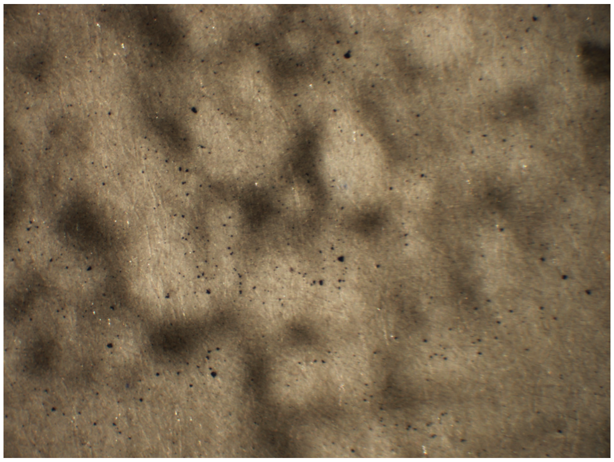


Figure 6b Detail of the print in fig. 5 (40× magnification), showing several larger pigment particles.

Figure 7a A Woodburytype of the actress Sarah Bernhardt, 1880s.

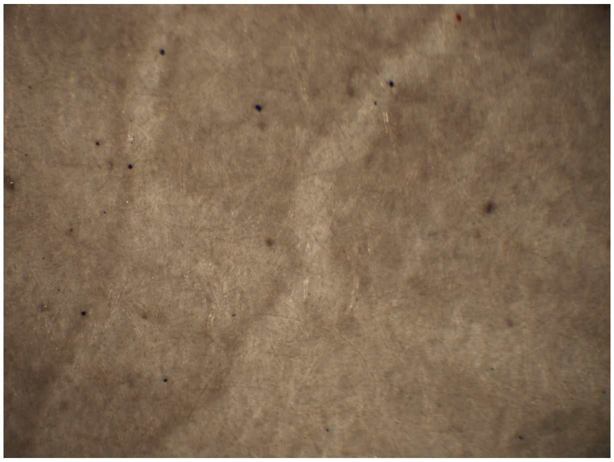


Figure 7b Detail of the white dress in fig. 7a (40× magnification), showing the fibers in the paper substrate.

Figure 8a *Street in Cairo*, 1875. Typical Woodburytype image.

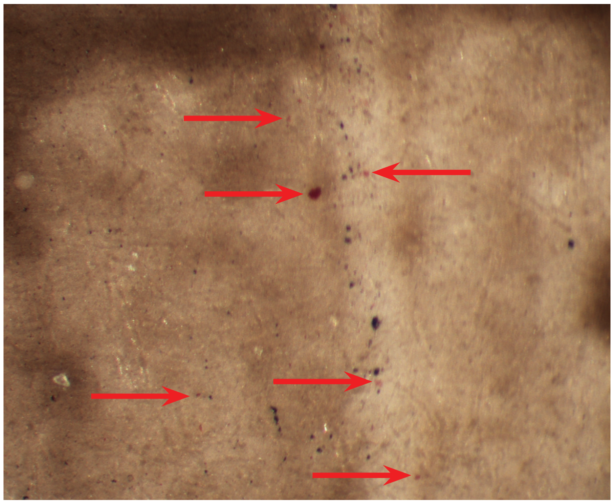


Figure 8b Detail of the print in fig. 8a (80× magnification). The red arrows indicate the presence of red particles in the lighter part of the image.

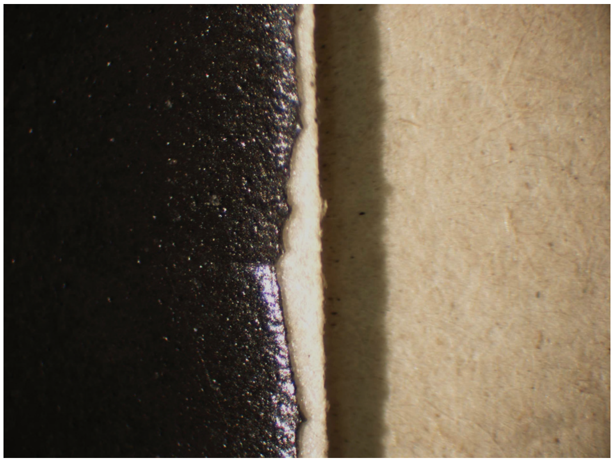


Figure 9 Detail of the edge of the print in fig. 8a (40× magnification), indicating damage to the gelatin layer.

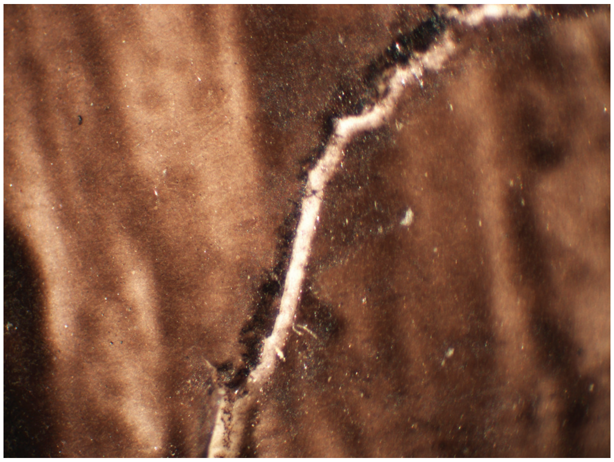


Figure 10 Detail of fig. 8a (40× magnification), indicating cracking and lifting of the pigmented gelatin layer within the image area.

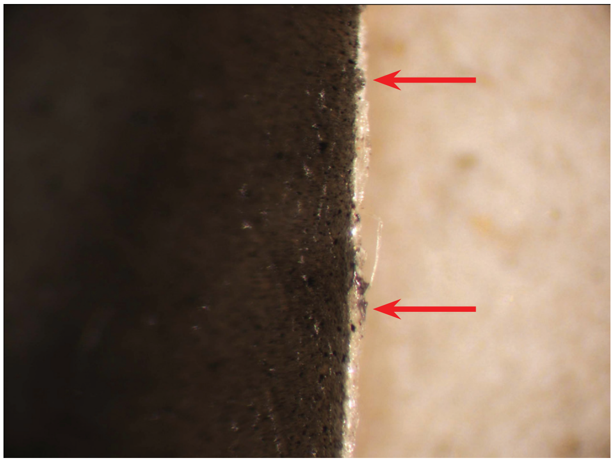


Figure 11 Edge deformation and ink smearing (indicated by the red arrows) on the Woodburytype in fig. 8a, visible under a microscope (80× magnification).

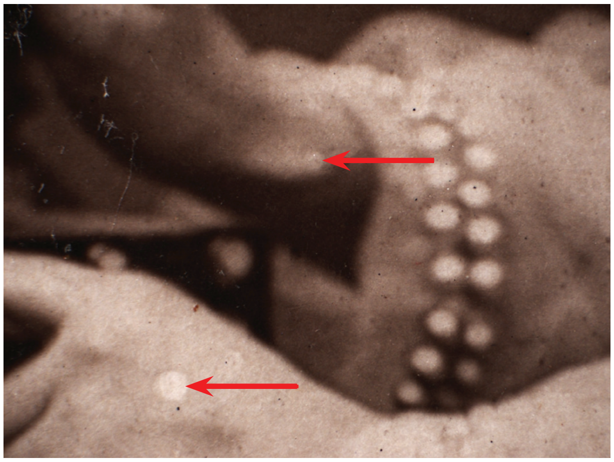


Figure 12 Detail of the area around Sarah Bernhardt's hands in fig. 7a (12.5× magnification). The red arrows indicate the white spots sometimes found on Woodburytype prints.

Because Woodburytypes are trimmed, microscopic examination of the print's edge area reveals a deformation typically caused by the application of a shearing force and often the smearing of gelatinous ink (fig. 11). Some Woodburytypes may also exhibit white spots from air bubbles formed during development (fig. 12).

Analytical Signatures

XRF

XRF analysis of Woodburytype prints shows an absence of any imaging metals (Ag, Pt, etc.) typical for most photochemically formed photographic images. XRF analysis using standard

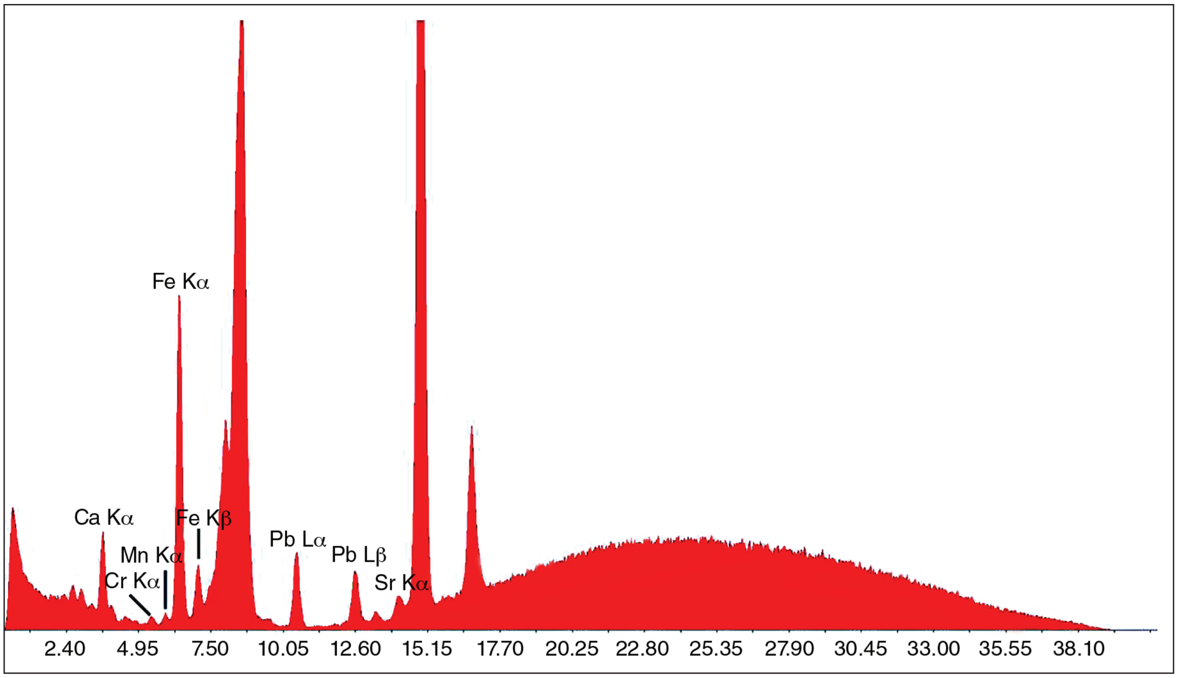


Figure 13 XRF spectrum of a typical Woodburytype image, identifying a small peak of chromium.

laboratory or portable XRF spectrometers cannot identify the low-atomic-weight carbon and organic dyes that were used when making the most commonly used Woodburytype inks. Most Woodburytype prints were also treated after printing using a 3% to 5% alum or chromium alum bath to harden the gelatin ink. A small peak of chromium can often be identified in a typical Woodburytype (fig. 13).

The XRF spectrum shows the presence of small concentrations of calcium (Ca), chromium (Cr), manganese (Mn), iron (Fe), lead (Pb), and strontium (Sr). However, almost all Woodburytype prints in existence were printed on paper substrates and, once finished, were mounted on thicker mounting board or thicker book pages. The resulting XRF spectrum thus represents the superposition of individual XRF spectra of the Woodburytype ink, the original Woodburytype paper substrate, the mounting board, and the inorganic impurities (if any) of the mounting adhesive.

An independent XRF analysis of the mounting board used in figure 8a allows separation of the spectral contribution of the mounting board (fig. 14). The analysis clearly shows that all chemical elements detected are also present in the mounting board. It is quite reasonable to conclude that most of the analytical signal of inorganic elements detected when analyzing Woodburytype prints originates from the mounting board and not the printed image. The small concentration of chromium in the mounting board makes it difficult to assess if the Woodburytype print was hardened using a chromium alum bath.

Both carbon and Woodburytype prints contain a concentration of chromium, but the concentration of chromium in carbon prints is typically about five times higher, as indicated in the XRF

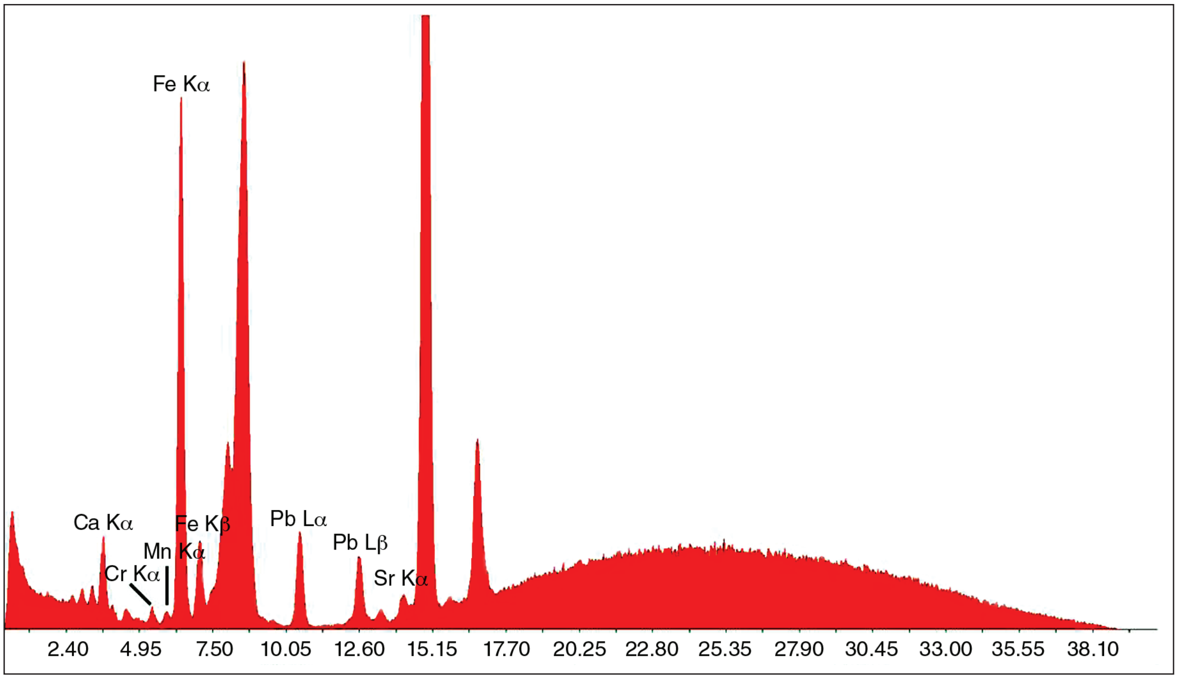


Figure 14 XRF analysis of the mounting board of the image shown in fig. 8a.

spectra in figures 15a and 15b. This makes the relative concentration of chromium the most important analytical signature that allows for the differentiation between Woodburytype and carbon prints. These XRF spectra show that it is not the absence or presence of chromium but the assessment of quantitative or at least relative amounts of chromium in the Dmax areas of both types of prints that can help to differentiate both photographic processes.

Some published recipes call for the use of lead compounds that can also be identified in some Woodburytype prints. Many nineteenth-century papers used in photography were treated or contained small amounts of lead, making it difficult to determine if lead (based on the identification of two main lead L spectral peaks at 10.55 and 12.61 keV) is present in the paper substrates or if it is a component of the Woodburytype ink.

XRF analysis of both Dmax and Dmin areas may provide important clues related to the source of lead. An almost uniform concentration of lead would indicate its presence in the paper substrate. Visible differences in concentration in Dmax and Dmin areas would indicate the presence of lead in the Woodburytype ink.

The technical literature recommends the use of small amounts of mercury chloride to increase shelf life. The presence of mercury (Hg) would be based on the identification of the L spectral peaks at 9.99 and 11.82 keV in the XRF spectrum of the Woodburytype print. Even after analyzing several dozen different Woodburytype prints, we have not been able so far to identify such a treatment.

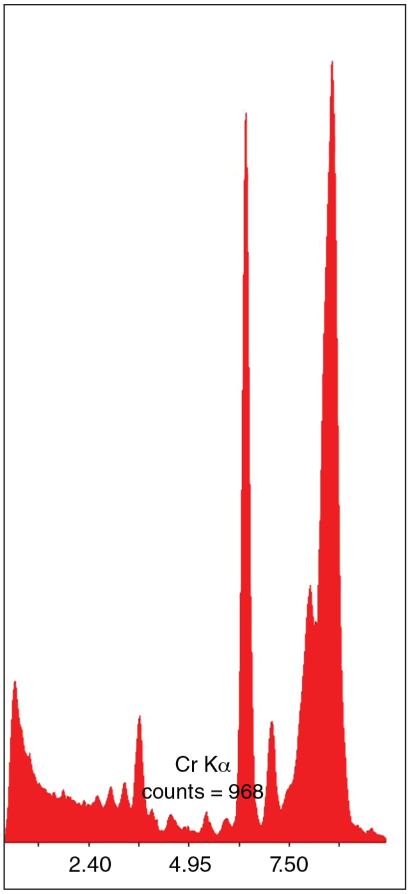


Figure 15a Relative spectral peak intensity of chromium in a typical Woodburytype print.

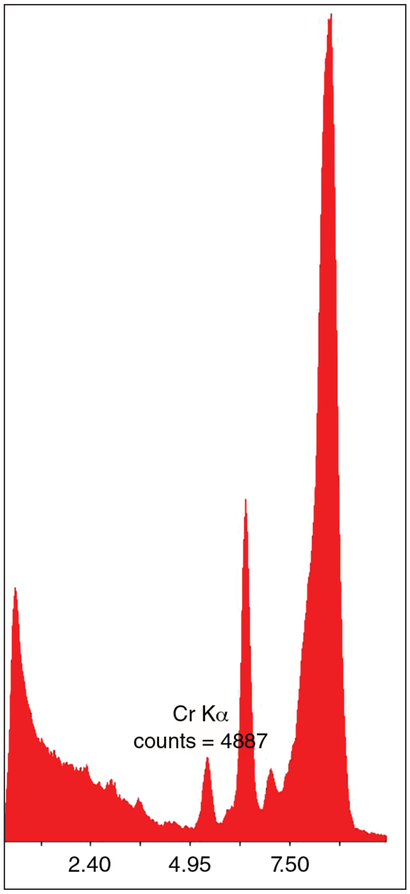


Figure 15b Relative spectral peak intensity of chromium in a typical carbon print (an Autotype Company sample book from 1927).

FTIR

ATR-FTIR analysis may provide important clues needed to differentiate Woodburytype and carbon prints. These clues can be obtained when exploring the chemical differences within the 3-D structure of both types of images. The analysis of the Dmax area of a typical Woodburytype image (fig. 16) shows the presence of a high concentration of pigmented gelatin (fig. 17). The detection of gelatin is not very helpful during the identification process due to the large number of other positive photographic processes that contain gelatin.

Printing a Woodburytype image requires a specially prepared, ultrasmooth paper usually made by treating an already smooth paper surface with shellac varnish and a thin gelatin coating and then calendering the surface to an almost mirror finish. This is necessary to achieve a continuous deposit of even the thinnest layers of ink when transferred from a shallow lead mold to a Woodburytype press. The Dmin area of the Woodburytype in figure 16 contains a very low concentration or no pigmented gelatin (ink) at all, and the ATR-FTIR analysis is able to detect the shellac coating of the paper substrate usually used for printing Woodburytypes (fig. 18). A group of spectral peaks at ~1710, 1245, and 1143 cm^{-1} indicate the presence of a shellac coating.

Figure 16 Woodburytype print. The red circle indicates the Dmax area, and the green circle indicates the Dmin area of the ATR-FTIR analysis.

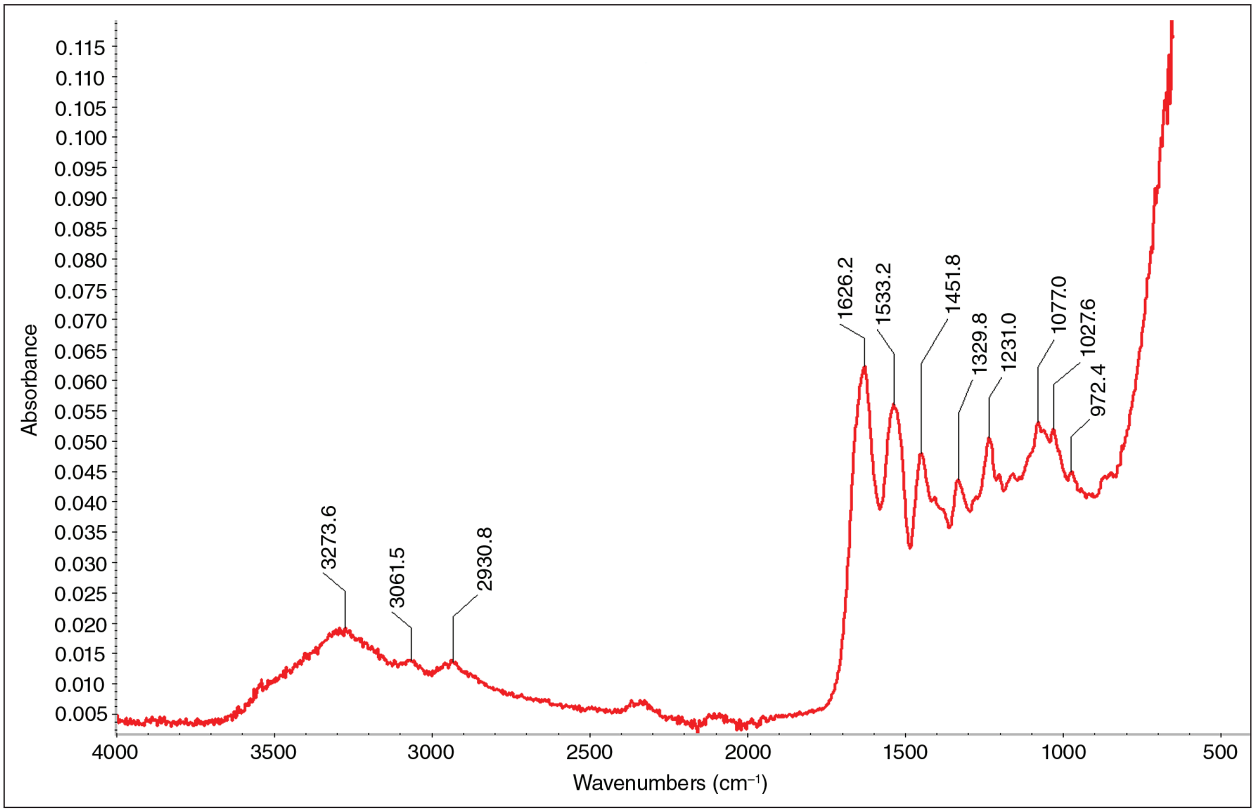


Figure 17 ATR-FTIR spectrum of the Dmax area of the print in fig. 16.

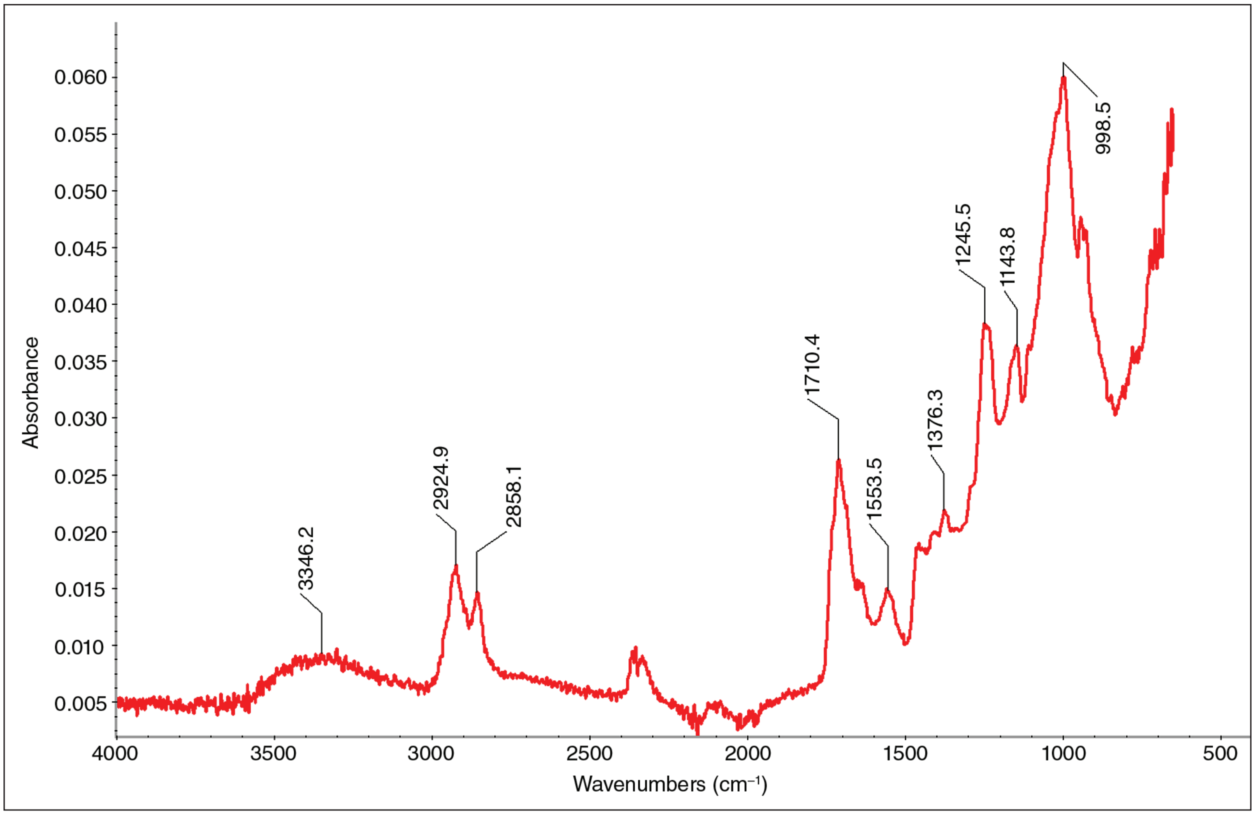


Figure 18 ATR-FTIR spectrum of the Dmin area of the print in fig. 16.

Post-Process-Treated Woodburytypes

Besides the chrome alum treatment mentioned above, Woodburytype prints were often surface treated to provide the desired optical effects—such as surface gloss, slight sheen, or matte appearance—or to protect the soft "ink layer" against mechanical damage. The most typical varnishes used to treat Woodburytype prints were collodion, shellac, and beeswax.

ATR-FTIR analysis was carried out on three different Woodburytype prints varnished with shellac, collodion, and beeswax, respectively. The ATR-FTIR spectrum of the shellac-coated print (fig. 19a) shows the presence of spectral peaks at 1710, 1236, and 1152 cm^{-1}, which are typical for shellac. The presence of a collodion coating (fig. 19b) is strongly supported by three strong, almost equidistant spectral peaks at 1634, 1268, and 827cm^{-1}, which are typical for nitrocellulose molecules. The beeswax coating (fig. 19c) is confirmed by the very strong C-H spectral peaks between 2920 and 2840 cm^{-1}, in combination with a sharp ester peak at about 1730 cm^{-1}.

IMPORTANT VARIANTS OF THE WOODBURYTYPE PROCESS

Stannotype
Photo-mezzotint (Swan)
Photo-filigrane
Photochromy (Vidal process)

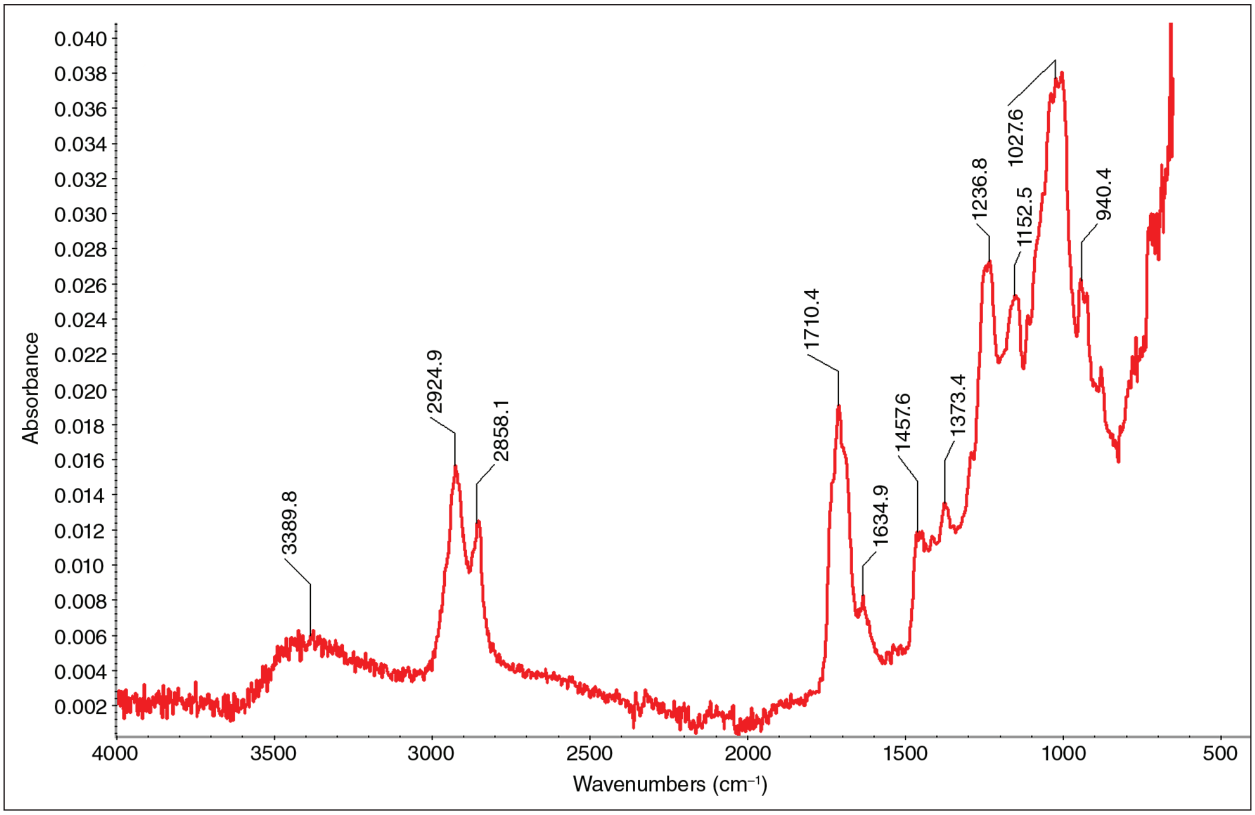


Figure 19a ATR-FTIR spectrum of a Woodburytype print varnished with shellac.

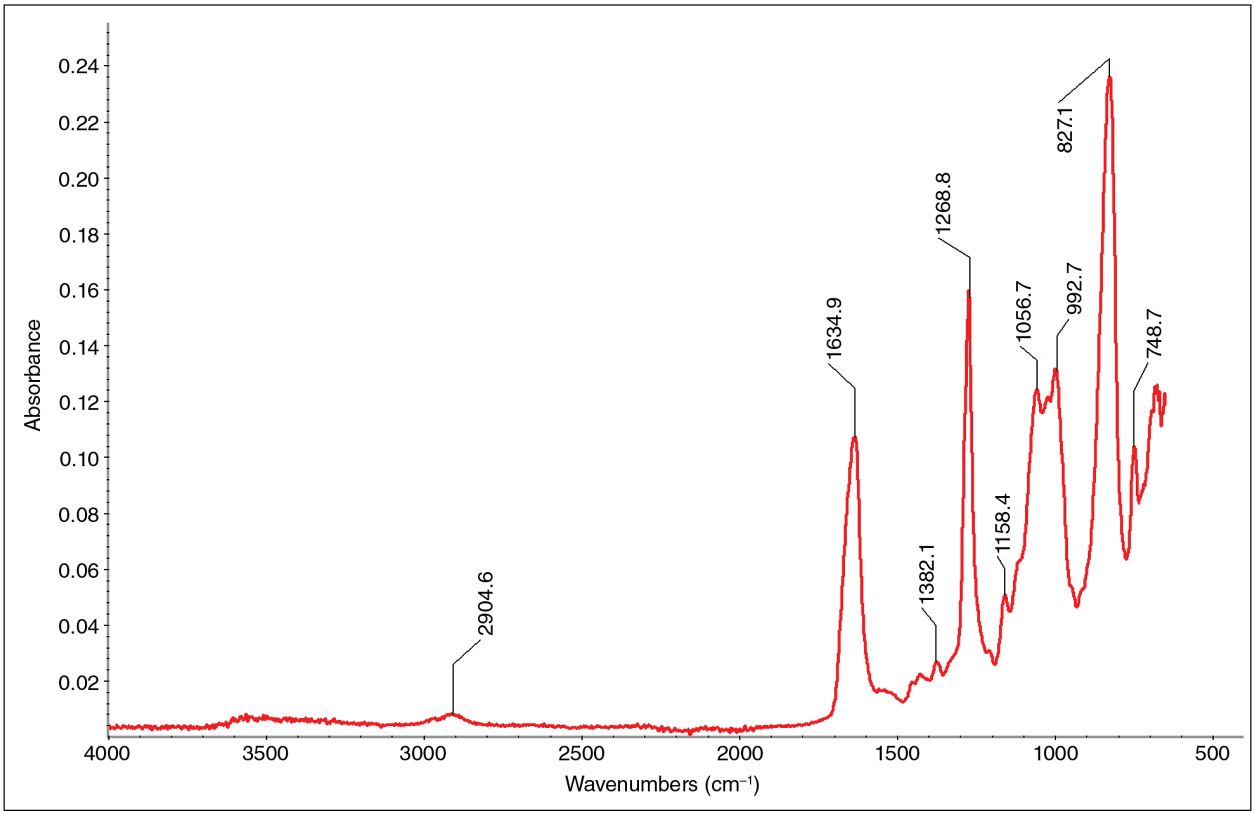


Figure 19b ATR-FTIR spectrum of a Woodburytype print varnished with collodion.

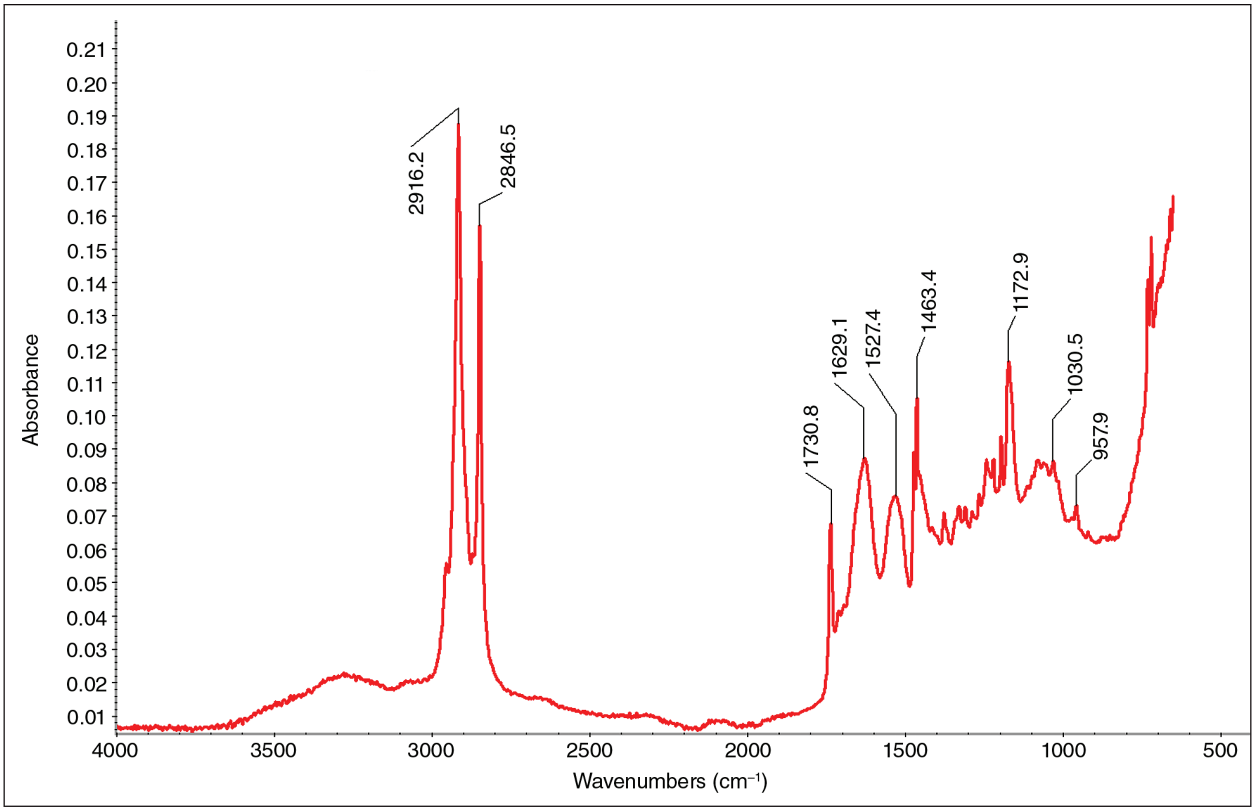


Figure 19c ATR-FTIR spectrum of a Woodburytype print varnished with beeswax.

STANNOTYPE

The Stannotype process was invented by Walter Bentley Woodbury (British, 1834–1885) in 1879.

A great disadvantage of the Woodburytype process was the need for a powerful and, thus, expensive hydraulic press in preparing lead molds for the letterpress type of the Woodburytype press. This requirement made the Woodburytype accessible only to a few dedicated printing facilities. Walter Woodbury tried to modify his printing process in a way that would not require a hydraulic press and would allow for the printing of larger-format prints. The Stannotype process fulfilled these requirements, but it was introduced during a time when other, competing photomechanical printing processes started to produce higher-quality reproductions of photographs. Still, the Stannotype process was complicated and could not be easily modified for the simultaneous printing of both photographs and text. Proposed modifications of both Woodburytypes and Stannotypes for rotary printing were tried and patented but did not yield any practical processes.

Process Description

A major difference between the Woodburytype and Stannotype processes is in the preparation of the positive mold for the Woodburytype press. Instead of using a plate made of lead and the ultrahigh pressure of a hydraulic press to produce a mold for the gelatin ink, a hardened and positive gelatin relief is pressed into tin foil supported by a yielding material (blotting paper or rubber). Making a positive gelatin relief mechanically rigid yields a precursor of the positive mold for Stannotype printing that is identical to that for classic Woodburytype printing. Several Stannotype modifications have been published by Woodburytype printers and amateur photographers, but these variants do not provide any special visual or chemical clues to aid in identification. In his 1879 patent Woodbury also included the potential use of other soft metal foils made of brass and lead. So far, however, no material proof has been found confirming that such materials were used in Stannotype-like printing.

Main Application of the Stannotype Process

The Stannotype process was used to make low-cost photomechanical printing accessible to amateur photographers and printers and to enable the making of larger prints that could not be printed using the standard Woodburytype process because of the need for exponentially higher pressures when making lead molds from larger gelatin reliefs.

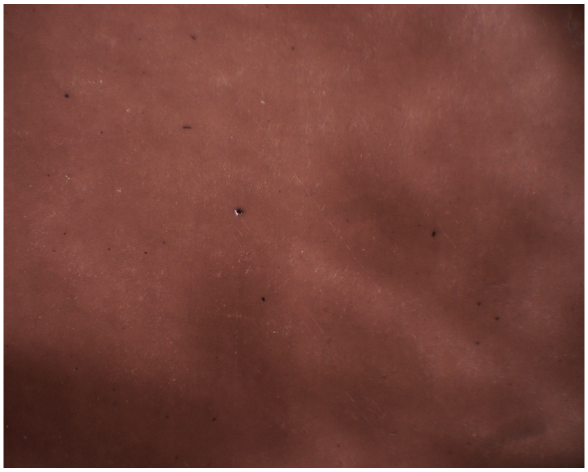
Important Variants of the Stannotype Process

In a twenty-five-copy special edition of his seminal book on the Woodburytype process (see bibliography below), Barret Oliver included an example of his modern variant of the Stannotype process using aluminum foil in place of tin foil (fig. 20). The microscopic and analytical signatures of this process are shown in figures 21–23. The presence of clearly visible pigment particle clusters is typical for all types of photographic processes using gelatin-pigment type "printing inks" or image materials (carbon, Woodburytype, Stannotype).

The XRF spectrum of Oliver's modern Stannotype shows that the artist printed his image on a baryta-coated gelatin photographic paper (the presence of both barium and strontium) that was

Figure 20 Barret Oliver, *Cloister*, 2001, Stannotype. An example of Oliver's variant of the Stannotype process using aluminum foil instead of the original tin foil. © Barret Oliver, 2001.

Figure 21 Microphotograph of the modern aluminum-based Stannotype variant in fig. 20 (40× magnification).



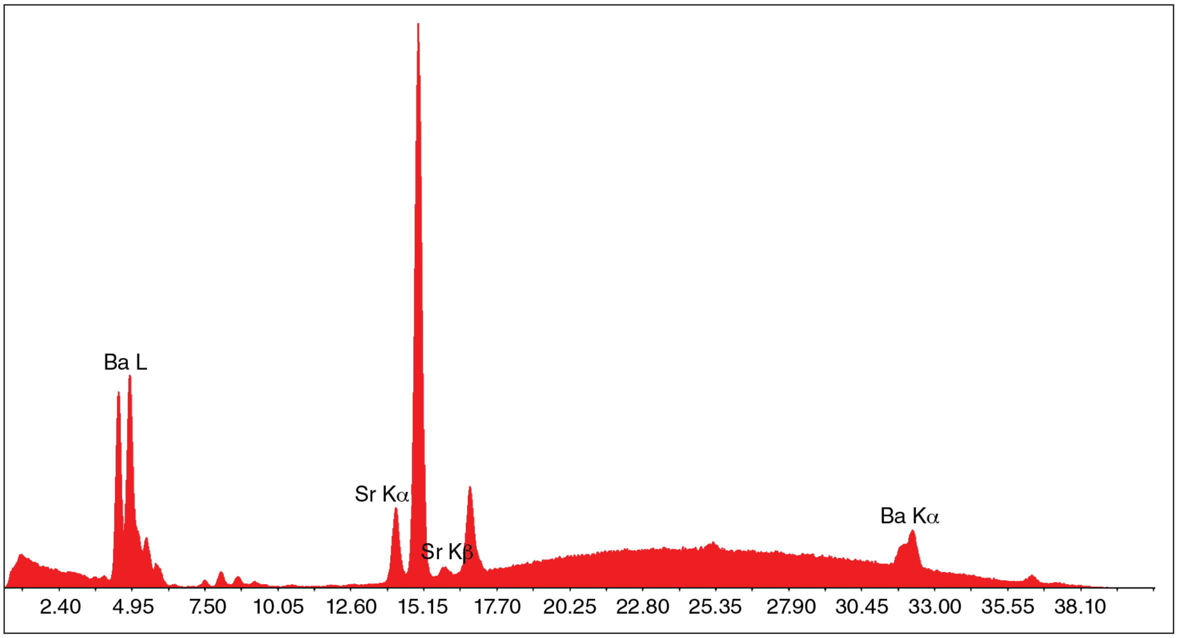


Figure 22 XRF spectrum of Barret Oliver's Stannotype in fig. 20.

fixed to remove any silver halide particles (the absence of Ag K and Ag L spectral peaks). The ATR-FTIR spectrum of the modern Stannotype shows the presence of the gelatin signal at both the Dmax and Dmin areas of the image. This is because a gelatin-coated baryta paper substrate was used to make the print, making the identification of modern Stannotypes very challenging.

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Nadeau, L. 1994. *Encyclopedia of Printing, Photographic and Photomechanical Processes.* Vols. 1 and 2. Fredericton, New Brunswick, Canada: Atelier Luis Nadeau, 434.

Oliver, B. 2006. *A History of the Woodburytype: The First Successful Photomechanical Printing Process and Walter Bentley Woodbury.* Nevada City, CA: Carl Mautz.

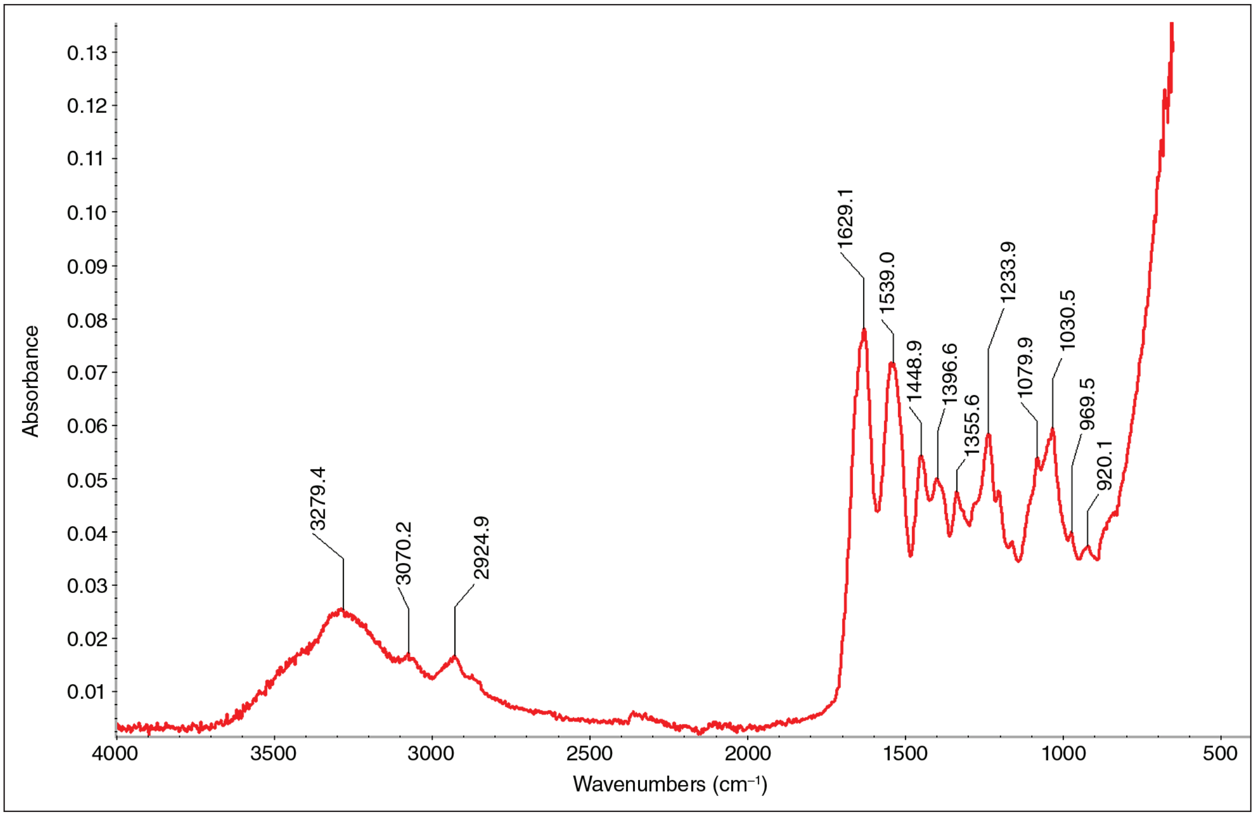

Figure 23 ATR-FTIR spectrum of Barret Oliver's Stannotype in fig. 20.

Stannotype Patents

Walter Woodbury, English Patent 3,760 (Sep. 19, 1879)
Walter Woodbury, English Patent 2,527 (June 10, 1881)

Identification: Stannotype

Almost all visual, microscopical, and analytical signatures of the Stannotype process are identical to those of the Woodburytype process. If a print is not clearly identified as a Stannotype, it is almost impossible to make a clear distinction between the two processes. The only clue that could be used to identify a Woodburytype-like print as a Stannotype would be its unusual dimensions. Most industrially printed Woodburytypes were of smaller size, so any Woodburytype-like print larger than about 8 × 10 inches may have been created using the Stannotype process.

PHOTO-MEZZOTINT

The photo-mezzotint process was invented by Joseph Wilson Swan (British, 1828–1914) in 1865.

Photo-mezzotint was a process developed during Joseph Wilson Swan's work on the development of the transfer variant of the carbon process. The process was almost identical to an early version of the Woodburytype process, and a bitter exchange of claims for the priority of invention appeared in the photographic literature between 1864 and 1866. Swan presented and described his process first, but Woodbury has the priority of first patent. Swan claimed that Woodbury's first patent did not cover printing on paper but only on glass, porcelain, and metal. The Woodbury Permanent Photographic Printing Company later obtained the rights to the photo-mezzotint processes.

Process Description

Swan's photo-mezzotint process can be divided into several individual steps:

1. Dichromate-treated carbon tissue (see Carbon section) is exposed to sunlight under a negative.
2. The exposed carbon tissue is mounted on a sheet of glass, with the uppermost exposed surface facing the glass surface.
3. The carbon tissue substrate is removed in a warm water bath.
4. The unhardened areas of the pigmented gelatin layer are washed away in hot water, creating a surface relief.
5. A gelatin rim around the relief is formed, and the entire relief is hardened using iron (II) sulfate or an aluminum sulfate treatment.
6. The still wet relief surface is dusted with silver powder, creating a thin but continuous layer of silver.
7. The silvered surface is electrotyped with copper, forming a rigid copper mold of the surface relief.
8. The back side of the relief is backed up (through a thick bitumen layer or other unspecified means) and a mechanically rigid mold is made.
9. The mold is mounted onto a letterpress thinly greased and filled with warm pigmented gelatin ink.
10. Printing paper is placed over the ink.
11. Even pressure is applied using the letterpress.
12. After several minutes of cooling and setting, the final print is removed from the press.
13. The print is stabilized (hardened) in alum solution and air dried.

Main Application of the Photo-Mezzotint Process

The main application is identical to that of the Woodburytypes.

Bibliography

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Photo-Mezzotint Patent

Joseph Swan, English Patent 1,791 (July 6, 1865)

Identification of Photo-Mezzotint Prints

Photo-mezzotint prints should have major visual and analytical signatures identical to those of Woodburytype prints. Differentiation between processes would be difficult. A lack of well-known and well-characterized photo-mezzotint prints has, to date, rendered it impossible to record good and reliable analytical signatures of the process.

Our study of published details of the process shows only one potential but definitively uncertain difference in the chemistry between the Woodburytype and photo-mezzotint processes: Swan recommends (BP no. 1791, 1865) the “fixing” of final prints in a bath of alum; Woodbury’s recommendation is to use chromium alum. If these recommendations were followed by practicing workers to a degree, this minor difference in print chemistry could be a usable clue in trying to differentiate both processes.

PHOTO-FILIGRANE

Photo-filigrane was invented by Walter Bentley Woodbury (British, 1834–1885) in 1878.

Patented in 1878, the photo-filigrane process was an interesting variant of the Woodburytype process that allowed the creation of continuous-tone watermarks in paper. Walter Woodbury had high hopes for the process, expecting that the printing industry would adopt it not only for creating new and beautiful watermarks for paper but also as an antiforgery feature on banknotes. He also proposed its use when printing on cloth. None of these hopes materialized, and the process found just a limited application as a photographic novelty.

Figure 24a shows a photo-filigrane print under reflected-light illumination. The same print, under transmitted-light illumination, appears in figure 24b.

Process Description

The photo-filigrane process is based on the formation of a hard gelatin relief following steps similar to those used in preparing a gelatin matrix for the Woodburytype process, the difference being the use of a thicker layer of chromated gelatin and carrying out the exposure under a positive transparency. Once a hard relief is created, it is pressed into a paper using a graphic rotary or stamping press. Under pressure, the high points of the gelatin relief permanently compress the original structure of the paper, making it thinner and more translucent when viewed under transmitted light. The less and more translucent areas of the pressed paper follow density differences of the original transparency. When viewed under transmitted light, a fully continuous tonal image is clearly visible.

The process is also known as photofiligrane, photo-filigrain, and photo watermarks.

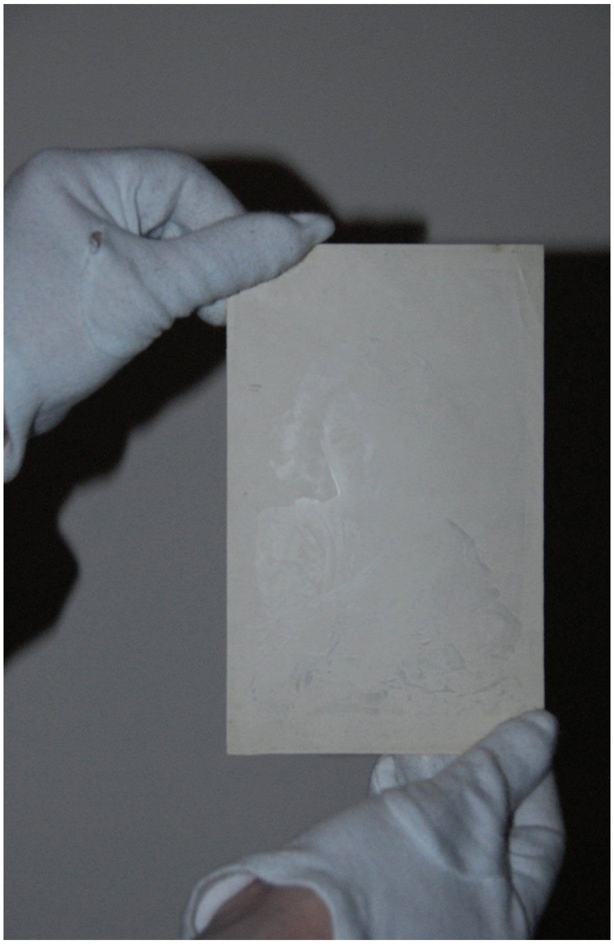

Figure 24a A photo-filigrane print under reflected-light illumination. Collection, National Media Museum (NMeM), Bradford, UK.

Figure 24b The photo-filigrane print in fig. 24a under transmitted-light illumination.

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Woodbury, W. E. 1894 (September). “Photo-Filigrane.” *American Bookmaker* 19(3): 77–78.

Woodbury, W. E. 1896. *The Encyclopaedic Dictionary of Photography*. New York: Scovill & Adams, 348.

Photo-Filigrane Patents

Walter Woodbury, English Patent 947 (Mar. 30, 1867)
Walter Woodbury, English Patent 2,171 (Aug. 4, 1870)
Walter Woodbury, British Patent No. 2912 (July 22, 1878)

Identification of Photo-Filigrane Prints

Identification of photo-filigrane images is usually rather simple. The image is visible when viewed in transmitted light. Under reflected light, the image is almost invisible or barely visible at raking-light illumination. A detailed examination is needed just to verify that differences in translucency of the paper are not accomplished by a press, by chemical treatment, or by the presence of a surface coating.

PHOTOCHROMY (VIDAL PROCESS)

Photochromy, or the Vidal process, was invented by Leon Vidal (French, 1833–1906) / Walter Bentley Woodbury (British, 1834–1885) in 1872–75.

The Vidal process (fig. 25) was not a true color photographic process; rather, it was a combination of two photomechanical printing processes. This combination produced very high quality reproductions but was such a difficult and expensive process that it was rarely used. An example of a Vidal process color print is shown in figure 25.

Process Description

In the Vidal process, glass-plate positives are made from the same negative for each color required and the areas not intended to be printed are covered with opaque ink. A standard photograph or Woodburytype is overprinted with a chromolithograph printed from several lithographic stones using transparent colors.

Figure 25 A Vidal process color print, from Paul Dalox's *Trésor Artistique de la France, Musée National du Louvre, Gallerie d'Apollon*. The Getty Research Institute (90-B34205).

Main Application of the Vidal Process

Most Vidal process prints can be found as illustrations in special books. Some prints are also created as individual series of landscape views and portraits. The most famous publication containing Vidal's photochromy images is Paul Dalox's *Trésor Artistique de la France, Musée National du Louvre, Gallerie d'Apollon*, volume 1 (1872) and volume 2 (1875).

IDENTIFICATION: VIDAL PROCESS PRINTS

Visual Characteristics

Color images made using the Vidal process, printed in vivid and sometimes "metallic" colors, exhibit a typical Woodburytype relief in darker parts of the image when viewed from an angle.

Identification Problems

The main identification problem related to Vidal process prints is their visual similarity to early chromolithograph prints. These prints do not exhibit the "relief effect" typical for both Vidal and Woodburytype prints.

INTERPRETATION GUIDE

Table 1 Summary of the main microscopic and analytical signatures of Woodburytype prints and some processes commonly misidentified as Woodburytype prints. The information below is for typical versions of each process. Exceptions to each entry may exist but are rare.

Woodburytype Prints

Process	Surface Coating	Paper Fibers	Fe	Cr	Ba	Other Inorganics	Celluose	Gelatin	Collodion	Albumen	Other Organics	Tonality	Notes
Woodburytype	(X)**	(X)	(X)	(X)	–	–	–	X !	(X)**	–	Shellac in Dmin	Brown to violet-brown (often mimics albumen)	Particle clusters, no border, usually mounted, relief
Carbon	(X)**	(X)	(X)	X	–	(Ti)*	–	X	(X)**	–	–		Particle clusters, relief
Albumen	(X)	X	–	–	–	Ag, (Au), (Pt), (Ti)*	X	–	–	X	–		Brown to violet-brown
Gelatin	(X)	–	–	(X)	X	Ag, Sr, (Au), (Ti)*	–	X	–	–	–		Baryta layer visible
Oil	–	(X)	–	X	–	–	X	X	–	–	Ester bonds, inks		Gelatin in Dmin, usually black tones
Bromoil	–	–	–	X	X	Sr, (Cu)	–	X	–	–	Ester bonds, inks		Gelatin in Dmin, baryta layer visible

X Present
– Absent
( ) May be present

! Key signature
(X)** Carbon and Woodburytype prints were sometimes coated with collodion
(Ti)* Some modern prints on 20th- and 21st-century substrates containing TiO_2

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