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# THE HISTORY AND TREATMENT OF THE IVORYTYPE

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## PROCESS

The American Ivorytype is an artistically manipulated photographic process that was specifically designed and used for portraits during the middle of the nineteenth century. The intent of the Ivorytype was to portray a glowing, three dimensional, life-like presence to the image of the sitter, comparable to, and imitating, the feeling of a painted ivory miniature and/or oil painting. The ivory miniature achieved this modeling effect as a result of its paper-thin ivory support which allowed light to pass through it. The light that entered was reflected back through the highlights of the image by a white backing card. A well composed photographic portrait that was artistically handpainted with watercolors and rendered translucent by the impregnation of wax also produced this quality, but could be fabricated in a fraction of the time.

Even though the making of the Ivorytype was less time-consuming than the ivory miniature painting, it was still a laborious process, requiring many procedures. To make this historical process, it required photographers to undertake the following steps: First, a portrait was taken of a sitter. Second, two salted paper photographs of the image were printed (although there are examples of Ivorytypes, equally as beautiful, that used only one). Third, both photographs were cut to the same dimensions so that alignment occurred when one was placed on top of the other. Fourth, both prints were hand painted with watercolors. The top print was painted with intensely vivid colors in a controlled manner, with meticulous attention paid to the details of fabric patterns, facial features and in the textures of any background objects, (if the photographer/artist was talented, this photograph quite convincingly passed as a painting). The bottom photograph was broadly painted

in the general areas of the image (dress, cheeks, background, etc.) using less saturated colors. Any modeling or dimensional illusion could be brought out by the painting techniques used on this photograph. Fifth, when the top photograph was dry, it was sealed to a sheet of plate glass with a mixture of white beeswax and gum dammar (or some other resin). As a result of waxing the top photograph, the watercolors became muted to normal intensity, and the image more vibrant through its transparent quality. The final step was to seal the top print, now attached to glass, together with the bottom print and a protective backing board. Sometimes spacers were introduced between the photographs which gave a greater three dimensional illusion to the image. This was accomplished using a paper tape or metal band.<sup>1</sup>

There are many variations of the Ivorytype; each with its own name and technique, and all equally capable of producing a beautiful, realistic portrait. Some of these variant processes were introduced to the public before the Ivorytype, yet most are referred to in this day, and even in their own era, as an Ivorytype. These processes so closely resemble the Ivorytype in procedure and visual appearance that it is easy to understand why this mis-identification occurs. For example, in the Hallotype Process, patented by J. B. Hall in England in 1855 and in America in 1857, the top photograph was sealed to the glass using just dammar varnish instead of a wax/dammar mixture.<sup>2</sup> The distinction of the Sennotype Process, introduced in 1864, is that its top photograph was coated with only pure beeswax, and it was not sealed to the cover glass.<sup>3</sup>

Besides varying waxing techniques, other photographers experimented with creating an imitation ivory support material that gave the same translucent effect to the image as that of the ivory support in painted miniatures. In these variations the emulsion was coated directly onto the imitation ivory. The most famous process of this style was popularly used during the same era in England, and bears the same name, the Ivorytype. This process was invented, and patented in 1855, by John Edwin Mayall, and the support material

consisted of barium sulfate and albumen.<sup>4</sup> (Its famous imitator is the Eburneum Process.) Another process whose support clearly has the translucent quality of ivory is the Opalotype, a hand colored photographic image on white or flashed glass.<sup>5</sup> Ivorytypes and the other variants ranged in size from whole plate (6 1/2" x 8 1/2"), the most common size, up to approximately 16 x 20 inches.<sup>6</sup>

## **HISTORY**

The Ivorytype appeared in photography studios when photography was a very young medium. At that time there were many skeptics who thought photography was not an art. As a result, what was created in other fine arts heavily influenced the style of photographers/artists, not only to induce acceptance of their work into the art realm, but also to ensure that a profit was made by their fledgling photographic businesses. By referring to Ivorytypes as "paintings" or "miniatures" in their advertisements, photographers/artists caught the public's attention and coaxed them into their studios. For example, J. W. Williams (an Ivorytypist from Philadelphia) advertised on the back of one of his Ivorytype packages that the portrait is "...to have all the beauty and appearance of the finest ivory painting."<sup>7</sup> In C. K. Miller's (a photographer/artist and teacher whose studio was located in Syracuse, New York) poster advertisement, he states his objective was to teach Ivorytype students to make, "The most beautiful and lifelike painting in the world."<sup>8</sup> Montgomery P. Simons (writer of photography how-to books who lived in Philadelphia) states in his do-it-yourself manual, The Secrets of Ivorytyping Revealed, that the objective of the photographer/artist is, "To produce a picture closely resembling a miniature on ivory..."<sup>9</sup> And the daguerreotypist and historian Marcus Root states explicitly in his book, The Camera and the Pencil or the Heliographic Art, "It is a colored photograph, finished so as to resemble a miniature or portrait on ivory."<sup>10</sup> The Ivorytype and other variants were high quality, realistic portraits (depending on the talent and skill of the photographer) which could be had for a fraction of the cost of an expensive ivory miniature or oil painting,

but they were every bit as beautiful. As a result, they must have been very appealing and affordable to obtain by the middle class.

In the photographic literature of today, and of its own era, there is some confusion as to who really "invented" the Ivorytype. Some historians state it was created by Frederick August Wenderoth, and first displayed in the 1859 fair at the Franklin Institute in Philadelphia, but information isn't available to support that a fair took place there in 1859.<sup>11\*</sup> In the April 15, 1859 edition of The American Journal of Photography, Charles Seeley, the editor, stated Oliver Sarony of Scarborough (a town in England?) had patented the Ivorytype Process on April 5, 1858. Sarony did patent this process, but the date was July 3, 1858.<sup>12</sup> Regardless of the historical debate and confusion, the Ivorytype Process was not invented by one person. It is actually a composite of various techniques, ideas, and mediums that were used with artistic intentions for centuries. These materials underwent an evolutionary process in their application to the art of portraiture (which underwent its own evolutionary process). It only makes sense that after 1839 these materials were applied to photography.

## **PROBLEMS**

The Ivorytype is susceptible to many problems regarding its stability because it is a composite of many different materials: salted paper photographs, wax, resin, watercolors, and glass. Each material has a complicated structure with individual aging characteristics and inherent problems. When these materials are united, these problems are amplified because the stresses and strains, and products of decomposition caused by one material's deterioration can effect the stability of another. The main problems that would disrupt the unification of these materials or make them more vulnerable to deterioration are: inadequate seal or complete removal of it, partial or complete separation of the waxed photograph from the glass, and breakage of the glass. Deterioration can also result from problems generated during original manufacturing; "...even a speck of dust will cause a *heap* of trouble should it find its way between the glass and

picture.”<sup>13</sup> Although in his book, The Secrets of Ivortyping Revealed published in 1860, M. P. Simons doesn't expound on the potential problems that could arise if dust did get trapped, it can be assumed that the adhesion of the picture to the glass would be at risk.

The deterioration of the Ivorytype is exacerbated and accelerated if stored under improper conditions including: high and low humidity, high and low temperatures, fluctuations of both of these, acidic conditions, long exposure to light, or exposure to extreme light levels. If deterioration occurs in any one of the component materials, the object can suffer greatly, visually as well as structurally. Because of these consequences, Ivorytypes must be stored properly in order to maintain the delicate balance of the materials.

## PHOTOGRAPHS

Essentially, the Ivorytype Process is the manipulation of a salted paper photograph. This photographic process is a printing-out paper and is "characteristically unstable".<sup>14</sup> The image making material consists of very fine silver grain particles that are absorbed into the surface fibers of the paper support. The fine quality of the silver particles makes them susceptible to deterioration through oxidation and reduction reactions.<sup>15</sup> This deterioration results in a loss of highlight detail and eventually leads to overall fading of the photograph.<sup>16</sup> It is characterized by a change in image contrast and/or image hue. Sometimes the instability of photographic materials is due to improper processing practices. Improper fixing or washing result in sulfiding deterioration, characterized by yellowing or overall fading of the image respectively.<sup>17</sup> Improper storage and handling conditions of the object can also accelerate the deteriorative processes. These photographs are also prey to the same types of deterioration inherent to paper, such as foxing, discoloration, stains, weaknesses, and brittleness.<sup>18</sup> Problems associated with the deterioration of the salted paper print quickly became well known in the nineteenth century, and all are very well documented today.<sup>19</sup>

## WATERCOLORS

Watercolors are composed of pigments ground to an extremely fine texture in an aqueous solution of gum acacia, or other binder.

Watercolors are known to be inherently unstable, some more so than others, such as Vandyke Brown, gamboge, indigo, and sepia.

Unfortunately, these more fugitive colors were recommended by M. P. Simons in his 1860 handbook as being "most suitable for painting Ivorytypes".<sup>20</sup> The most frequent types of watercolor deterioration encountered are fading, cracking and flaking. The rate of deterioration is dependent on: the storage conditions enumerated above, the thickness of application, the binder used, and possibly the processing of the photographs. Some colors can cause the deterioration of other colors, and some can even cause the deterioration of photographic images.<sup>21</sup> Cracking and flaking of watercolors are caused by an excessive use of gum, and/or by the expansion and contraction of the watercolor due to fluctuations in environmental conditions. Flaking watercolor can possibly cause the wax to detach from the glass.

## BEESWAX

Ideally, Ivorytypes were made with pure white beeswax (sun bleached beeswax) which was adulterated with gum dammar, although some inferior waxes, resins and other materials were also used. The chemical composition of beeswax is 16% Hydrocarbons, 31% Monohydric Alcohols, 3% Diols, 31% Acids, 13% Hydroxy-Acids, and 6% colorants (propolis [bee glue] and pollen contaminants).<sup>22</sup> The melting point is between 142-149 °F (a little bit higher if bleached). Beeswax is soluble or partly soluble in petroleum ether, chloroform, carbon tetrachloride, anhydrous ethyl alcohol, acetone and turpentine, amongst other spirits. While beeswax is considered to be chemically stable, there are inherent physical problems associated with it. The main problems associated with wax are: it is subject to shrinkage and embrittlement, resulting in cracks and breakage; it is easily scratched; dirt can easily become embedded in it; and depending on the adulterant material added, it can yellow and discolor with age and/or can be subject to insect attack.<sup>23</sup> These

conditions are exacerbated if the object is kept in adverse storage conditions or mishandled.

## RESINS

A wide variety of both natural and synthetic resins is available on the market today, but natural ones were prevalent in the 19th century. Natural resins are exudates of trees or found as fossilized gums. Their composition is a mixture of aromatic acids, aliphatic acids, resinols and resino-tannols, resin acids, resenes, and essential oils.<sup>24</sup> They are especially susceptible to decomposition and yellowing when exposed to ultra-violet light.

Gum Dammar is a very hard and transparent resin gathered from trees in Malaysia and the East Indies. There are many grades available and some are considered to have better qualities than others, such as hardness and transparency. The melting point of Dammar is approximately 284°F, and it is soluble or partly soluble in anhydrous ethyl alcohol, acetone, amyl alcohol, carbon tetrachloride, ethyl dichloride, and turpentine. Dammar is greatly appreciated for its colorless appearance, and because of this quality, it is slower to yellow than most other resins. This property is the reason Dammar was used quite often as a varnish.

In the making of Ivorytypes, the ratio of wax to resin or other adulterant material varied, depending on what mixture the artist/photographer felt gave the right translucency to the photograph. A greater percentage of resin made the print look more brilliant. An excess of resin will eventually cause the wax to yellow.<sup>25</sup> With examination by eye or with the aid of a microscope, it can sometimes be discerned whether just a wax or resin was employed. This task is more difficult when mixtures of both were utilized. A precise determination of the composition of the wax/resin mixture requires a more exact analytical method such as Gas Chromatography or infra-red absorption spectrometry.<sup>26</sup>



## GLASS

Glass has been used since antiquity, and the chemical and physical properties of glass are directly related to its composition of soda, lime, and silica. Depending on the purpose for the glass, metal oxides, such as lead, barium, potassium, and iron are added. The composition of 19th century sheet glass utilized by Ivorytypists is dependent on the geographical area the glass was obtained from. The main deteriorations of glass are: "weeping" or "sweating", droplets of residue, scratches and abrasions, and breakage. The main causes of deterioration are: the composition of the glass (a high alkali content causes low resistance to chemical deterioration), the storage conditions stated above (especially excessive humidity), pollutants, and improper handling.

## CONSERVATION

With respect to the conservation of Ivorytypes, their treatment essentially involves five areas of concern: 1. cleaning; 2. repair of cracks and losses in the wax; 3. reattachment of the photograph to the glass; and 4. resealing. Long term stability and preservation of these objects entails proper handling, proper environmental storage conditions and responsible exhibition practices. The conservation of the individual components of the Ivorytype have been thoroughly documented in other articles, and therefore will not be extensively addressed in this paper.

I advocate minimal intervention in the conservation of Ivorytypes because of their complex nature. Although possible treatments for Ivorytypes (and other similar variants utilizing a wax and/or resin mixture) are listed below, the limitation of these treatments is a reality. Any treatment performed should be designed specifically for the Ivorytype in need of treatment. Proper conservation procedures, such as examination and documentation, are necessary before any treatment is undertaken. This step is especially important because of the many variants found in the Ivorytype family. The seal of an Ivorytype should never be removed unless something within the package necessitates it, such as the non-alignment of the prints.

## CLEANING

The cleaning of the outside of the glass can be accomplished by using distilled water and a mild soap, such as Ivory (care should be taken not to disrupt the seal). If the seal is broken and cleaning of the back of the waxed print is necessary due to excessive dirt, lightly brush it with a sable hair brush. Minimal cleaning of the surface of the bottom photograph, such as gentle brushing with a sable hair brush or dry cleaning with a soft vinyl erasure should be the only treatments undertaken. Cosmetic damage on the bottom photograph, in most cases, should not be an issue because the photograph is usually not viewed without its companion print on top of it.

If the waxed print is detached from the glass and is extensively dirty, the waxed surface of the print can be washed. First, the print should be thoroughly examined to ascertain if there is any handcoloring or small shards of glass on the surface of the wax (as sometimes is the case). If there is coloring, careful thought should be taken as to whether washing is an appropriate procedure for the object. If there are glass shards, with the aid of a microscope use a fine tweezer to carefully remove them. Once examination is performed, the following cleaning procedure can be undertaken: first, lightly brush the waxed surface with a sable hair brush to remove all loose dirt and abrasive particles. Second, gently wash the surface with a sable hair brush minimally wetted with a 2% Lissapol\* and distilled water solution. Finally, using the washing brush and distilled water, ensure the complete removal of the soap.<sup>27</sup>

## REPAIR OF CRACKS AND LOSSES IN THE WAXED PHOTOGRAPH

There are three types of cracks: 1. "superficial" cracks; 2. cracks accompanied by slight fissures and cupping; and 3. cracks that are accompanied by tears in the paper. Cleaning of the cracks should be done before repairs are made, and should be limited to gentle brushing with a sable hair brush. Repairing of cracks should be done with the assistance of a microscope.

\* A non-ionic wetting agent available at Talas 213 W. 35th Street NY, NY 10001-1996

Cracks are repaired either by the action of a solvent alone, or in combination with a waxed fibrous material, such as japanese paper, that is impregnated with wax.<sup>28</sup> A loss may be filled with beeswax. Cracks that are superficial can be repaired using a solvent. As stated above, beeswax and gum dammar (and most resins) are partly soluble in anhydrous ethyl alcohol. Brush a little of this solvent at the edge of the cracks to soften the wax (this solvent is preferable because of its low toxicity compared to the others listed above). Once softened, the seam can gently be worked together using a microspatula. A piece of silk paper between the waxed surface and the spatula prevents burnishing marks from occurring. The same procedure is used for cracks with slight fissures and cupping. With cupping deterioration, it is especially important to take care that the wax is soft, or any manipulation of it with a spatula could cause the wax to break.

Cracks in the wax that are accompanied by a tear in the paper support can be repaired and reinforced using a very fine piece of nylon (or fine japanese paper) impregnated with beeswax.<sup>29</sup> This is attached to the verso of the photograph by the use of anhydrous ethyl alcohol, and worked together using a microspatula, or by lightly ironing with a slightly heated microspatula. Proceed with caution if using heat treatment because the danger exists that the wax can melt uncontrollably; the microspatula need only be slightly hot. The use of a protective paper, such as silk paper, between the object and the spatula is recommended.

Losses should only be filled if located in a visually objectionable area of the portrait. Fills are accomplished by adding melted wax to the loss. The fill wax should be cool, yet not solidified. The wax is filled to slightly above the surface plane. The wax is brought down to the right height with slight manipulation of a heated spatula. Anhydrous ethyl alcohol can be brushed on to achieve uniformity.<sup>30</sup> The new wax can be retouched with watercolors to make it consistent in color with the aged waxed.

The treatments above should only be performed if the cracks are on the verso of the waxed photograph, or if the photograph has become completely detached from the glass. Extreme care should be taken at all times so as not to cause any further lengthening of the crack or detachment of the photograph.

#### REATTACHMENT OF THE PHOTOGRAPH TO GLASS

Reattachment of the photograph to the glass might be necessary in small areas of the print, or to the whole print itself, due to delamination. If there is any flaking of watercolor in the area of concern, this treatment should not be performed, or the watercolors should be reattached first. For small areas in need of reattachment, three methods can be employed: 1. pressure; 2. solvents; and 3. heat. Slight rubbing pressure on the detached area using a microspatula and a protective paper can sometimes re-adhere the wax back onto the glass. This procedure can be combined with local brush application of anhydrous ethyl alcohol, or heat. The wax need only be slightly pliable for burnishing to the glass.

In some cases, reattachment of the waxed print to the glass might be necessary due to breakage of the glass, or loss of adhesion of the wax due to excessive heat or fluctuating environmental conditions which cause the wax to expand and contract. Balint Flesch, a conservator from Budapest, Hungary, recommends using the same original preparation methods of the Ivorytype if the waxed print comes detached from the glass.<sup>31</sup> Although I have never reattached waxed photographs that are completely separated from glass, I have performed original attachments. In my experience, attachment of the photograph to the glass with the wax/resin mixture is not simple and requires much practice before accomplishing the task adequately. Therefore, I would not recommend the undertaking of reattachment before having adequate experience in working with the materials. In most cases, careful preservation by simply rehousing the Ivorytype should be the only action taken.

## WATERCOLOR

In an Ivorytype, watercolors are used on both photographs. In examples that I've seen, the watercolors of the top photograph seem to have undergone little, if any fading; the watercolors that are beneath the edge of the mat, or frame appeared to be as intense as those in the center of the picture. It seems the permeated wax/resin functioned like a preserver for the watercolors sealed within it, and maybe even as a filter for the ultra violet end of the light spectrum if it yellowed. It was hard to assess any fading of the bottom photograph's watercolors that did not display any localized fading due to a broken seal. If it did occur, it is probable the fading happened overall. Because of its position in the Ivorytype package, retouching of the bottom photograph is unnecessary in most cases.

In a Hallotype I observed cupping of watercolor in the eyes of the image. This was probably due to the thickness of application, or the binder material used. No treatment was performed on this object because the watercolor was firmly situated within the resin and between the glass, and all components seemed to be stable. Although, if watercolor is painted on top of the wax (which can occur in a Sennotype), and displays cupping or flaking, it might be necessary to re-adhere the pieces. This procedure is accomplished with the aid of a microscope in the following manner: first, using a 10/0 brush, a 2% solution of Klucell "L" in ethanol is placed behind the flakes. Second, using another brush, add a little ethanol in the same area to help the Klucel penetrate. Finally, with a spatula and a piece of silk paper, lightly pressed the flakes flat. Ethanol can be used to remove any excess Klucell.<sup>32</sup>

## SEALING

After an Ivorytype is treated, or if its seal is broken or completely removed, it should be resealed. Sealing the object is necessary, not only to view the piece properly and safely, but to protect the object's vulnerable components from physical damage and chemical deterioration. Before resealing, the objects are put in their appropriate order: glass/waxed photograph, the bottom (or second)

handcolored photograph, and the original backing board backed by a sheet of the same size mylar. For further protection, a two ply ragboard can be placed between the original backing board and the bottom photograph. The package can be sealed on all sides using tapes made of polyvinyl acetate adhesive and japanese paper or other suitable archival tape.

## STORAGE AND EXHIBITION REQUIREMENTS

Given the complex nature of the Ivorytype, the general concern is not to subject it to extreme climate conditions or fluctuations. In respect to the recommended environmental storage conditions of the individual components, the Ivorytype should be stored in a climate of 30-40% relative humidity and between 50-60°F. For better preservation and further physical protection of the object while in storage, a secondary housing should be fabricated. All components of the Ivorytype are light sensitive. Therefore, they should be exhibited for a short time only in no more than 5-10 foot-candles of ultra-violet filtered light. Traveling Ivorytypes should not be considered an option because fluctuating temperatures and relative humidity can cause and accelerate their deterioration.

## CONCLUSION

Although the Ivorytype was a 19th century creation, the style of the portrait, and the use of the materials have a long history of development dating back to the 2nd century B.C. The impetus for the creation of the Ivorytype was twofold: to photographically create a glowing and vibrant, life-like portrait in a few hours (compared to the ivory miniature which took many days), and to create a profitable photographic business.

The Ivorytype is a complex object made of complex materials. Individually these materials are very vulnerable to unfavorable storage and exhibition conditions. When the materials are brought together as a unit, the object becomes more difficult to care for because each material reacts differently, and sometimes separately to the unfavorable conditions. Because of its complexity, it is obvious

any treatment to an Ivorytype is difficult. Because of its fragility, and because it is an historical object of elegant beauty it deserves the best care possible. Therefore the task at hand is to preserve the Ivorytype by providing the proper housing and storage conditions, and by responsibly displaying it. These measures will keep the component materials of the Ivorytype in harmony to ensure that the pleasing visual quality of the image will last.

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## ENDNOTES

<sup>1</sup>M. P. Simons, The Secrets of Ivorytyping Revealed: or, Every Photographer His Own Artist. (Philadelphia: J. B. Lippencott & Co., Pub., 1860), pp. 19-41.

<sup>2</sup>Luis Nadeau, Encyclopedia of Printing, Photographic & Mechanical Processes. 2 vols.. (New Brunswick, Canada: Atelier, 1989) p. 123.

<sup>3</sup>Ibid., p. 425.

<sup>4</sup>J. E. Mayall, "Photographs on Factitious Ivory," Journal of the Franklin Institute. Vol. XXXIII (1857) pp. 189-90.

<sup>5</sup>Luis Nadeau, Encyclopedia of Printing, Photographic & Mechanical Processes. 2 vols. (New Brunswick, Canada: Atelier, 1989), p.351.

<sup>6</sup>F. W. Wenderoth, Ivorytype, [16" x 20" portrait of his daughter], (81:2053:01) International Museum of Photography at George Eastman House.

<sup>7</sup>J. W. Williams, Ivorytype, (77:788:2) International Museum of Photography at George Eastman House.

<sup>8</sup>C. K. Miller, Advertisement for Ivorytype Lessons, (93:516:1) International Museum of Photography at George Eastman House.

<sup>9</sup>M. P. Simons, The Secrets of Ivorytyping Revealed: or, Every Photographer His Own Artist. (Philadelphia: J. B. Lippencott & Co., Pub., 1860), pp. 19-41.

<sup>10</sup>M. A. Root, The Camera and the Pencil: or the Heliographic Art. (Philadelphia: J. B. Lippencott & Co., 1864; reprint ed., Pawlet: Beaumont Newhall, 1971), p. 305.

<sup>11</sup>Luis Nadeau, Encyclopedia of Printing, Photographic & Mechanical Processes. 2 vols. (New Brunswick, Canada: Atelier, 1989), p. 135.

\*A telephone conversation was held with Gladis Brewer, librarian at Franklin Institute Museum, Philadelphia, Pennsylvania. In the conversation she stated that, according to the Bound Reports of Exhibitions, a fair (they were actually called exhibitions) did not take place in 1859. Fairs took place in the years 1854, 1856, 1858, and not again until 1874. No information was found on Wenderoth or the Ivorytype by Ms. Brewer in these yearbooks. If there was an exhibition in 1859, it doesn't seem to be documented.

<sup>12</sup>Peter C. Bunnell and Robert A. Sobieszek, Patents for Inventions Abridgements of Specifications Class 96, Photography Periods 1839 through 1900, vol. 1 (N.Y.: Arno Press 1979), p. 118.

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<sup>16</sup>Ibid., p. 34.

<sup>17</sup>Ibid.

<sup>18</sup>Ibid., p. 35 & 36.

<sup>19</sup>Ibid., p. 33 & 34.

<sup>20</sup>M. P. Simons, The Secrets of Ivorytyping Revealed: or, Every Photographer His Own Artist. (Philadelphia: J. B. Lippencott & Co., Pub., 1860), p. 44.

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