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From Luminous Pictures to Transparent Photographs: The Evolution of Techniques for Making Magic Lantern Slides

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In this article, I examine the evolution of techniques for registering images on glass used in the manufacture of magic lantern slides. This will show that, even before the arrival of the cinematograph, it was possible to have the full development of an audiovisual industry associated with objects of everyday use. The manufacture of glass lantern slides went through three stages of development. Painting techniques were the first to be employed. Hand-painting gave way to printing techniques in the first half of the nineteenth century, and in the second half, to photographic techniques, although the last two often included hand-coloring.

Glass Painting Techniques Used in Creating Magic Lantern Slides

The glass industry underwent a great boom starting in the last quarter of the eighteenth century, when the production of glass became less expensive. It became possible to manufacture high quality glass to use in optical instruments such as the camera obscura, the microscope, and the magic lantern. With its projection of images and the synchronic use of sounds, the magic lantern was an audiovisual form that always relied on glass as its fundamental medium for registering images.

Very few magic lantern slides survive from the period between the last half of the seventeenth century and the last quarter of the eighteenth. The transparencies from this period were roughly and irregularly painted on thick glass with slight waves and small air bubbles on the surface. These first glass slides usually were circular or rectangular, the latter horizontally much longer, with several images shown lengthwise. The images, painted in water color or oil, often by the lanternists themselves, represented scenes ranging from fables and children's stories to mythological, allegorical, and comic themes to current events.

To illustrate this type of graphic narrative, we should perhaps recall how in 1781, Benjamin Martin, a British author of books on science, gave testimony in his work, *The Young Gentleman and Lady's Philosophy*, of a magic lantern show in which images of a coronation were projected. They most certainly referred to the coronation of George II in 1727 or George III in 1760. The text takes the form of a dialogue between an academic, Cleon, and a young girl called Euphrosyne (Martin 1781, 288–289):

> **Cleon**: However, I must entertain you with something of this Kind, and, because the Subject shall not be low, I have procured an Artist, well-skilled in this Miniature Painting, to draw on two or three Slips of Glass the whole Proceeding of the late Coronation, which, when you observe the Motion on the Wall, you will certainly have a different Idea, that what you have hitherto entertained of these Subjects. See, I put the Slips in, one after another, and will move them in a proper Manner, while you take a cursory View of them as they pass in the regal Procession.
>
> **Euphrosyne**: This will be an elevated Subject, indeed: Good Heavens! The Herb-Woman appears at greater Advantage than when I saw her on the Platform at the Time. The Painter has certainly complemented her six Maids. The Flowers lie as naturally on the carpet as I then saw them. A delightful Appearance, indeed; the various Orders and Degrees of Gentry and Nobility, with their proper Habits, Robes and regal Investments bring to my mind so naturally the Thing itself, that I really judge this View, by Candle-light, much to exceed that by Day-light, if it may be so called when they returned from the Abbey.

Testimonies like this show how painting on glass was understood to require mastery of a difficult skill, since the projections unmercifully magnified the tiniest detail, and thus a tiny speck would be seen as an enormous spot, and a disjointed drawing would exhibit clear evidence of its mediocrity. Color transparency was another problem added to the possible irregularities of the glass medium: if the layer of paint was applied too thickly, or too much pigment was used, the images would turn into dark shadows. Today it is easy to recognize transparencies from the seventeenth century because the use of pigments and paints was not very skillful.

Watercolors generally were preferred to oil owing to their transparency. For example, the German Christian Gottlieb Hertel mentioned as early as 1716 in his work *Vollständige Anweisung zum Glass-Schleiffen* how at first he used oils, but then he saw that over time the colors turned brown and even-

tually became completely dark and opaque. For this reason Hertel ends by recommending the use of watercolors, as their color was more stable, and with a coat of varnish they became more intense and transparent.

Also, Hertel advised drawing first on paper the images to be later produced on glass magic lantern slides. Then he would place a thin piece of glass on the drawing and trace the exact outline of the drawing in black or brown such that it could be eliminated with vinegar. Once this was done, Hertel delicately painted the interior of the outline in watercolors, seeking a transparent effect, then covered the rest of the glass in opaque black paint so that the drawings and colors would stand out. An inscription could then be written on this black background using a needle or fine paintbrush. Finally, it all had to be covered in clear varnish to protect the paint from heat and damp.

The most delicate stage of painting magic lantern slides was the preparation of the watercolors. The artist had to be something of a chemist, able to manipulate substances such as dragon blood (a red resin), cow bitters, or ground bladder with great care. He also had to know how to deal with varnish –a mixture of sandarac (cypress resin), mastic (mastic resin), wine spirits and lavender oil–so that it would not crack, and therefore a bit of turpentine was added.

Another German author, C. L. Deneke, gave very precise instructions in his *Vollständiges Lehr-Gebäude der ganzen Optik* (1757) on how to paint glass slides for magic lanterns. In the first place, he emphasized the need for acquiring pure crystal from France or Bohemia, and then the importance of charging a glassmaker with cutting it to shape in the form of discs, squares or rectangles, in a slightly smaller size than that of the lantern's condensing lens. The glass was first cleaned with ground gypsum, and then using a weight and a little glue, the artist would place on the glass plate the images previously drawn on paper or taken from an engraving. Next, with a fine paintbrush and a little ground black pigment of animal origin, to which he had added some linseed oil and painter's varnish, he would very carefully and accurately retrace the outline of the design on the glass. Once this was done, the glass was removed and the drawing corrected if necessary.

Once the drawing on the glass had dried, Deneke added the shadows; that is, he would draw the black lines showing the folds in clothes and similar traits. Then there was another wait. Meanwhile the painter could prepare his brushes and colors: Berlin blue; indigo; yellow from berry juice; green lily; a beautiful red squeezed from authentic Pernambuco wood (an exotic leguminous tree), boiled and prepared; brown from the sap of walnuts; distilled verdigris, and so on. When the shadows were ready, Deneke then applied a mixture of pigments and varnish on the glass using a paintbrush. The next step consisted of covering the background with

Fig. 1. 19th century British hand-painted lantern slide. Wells collection.

black oil paint. Shadows could also be added to the illustrations after they were colored. Finally, he built wooden frames for them out of dry beech. If the glass was circular, he would make hollows in a wooden board and place six discs on one board. If the glass slides were square, he would place four, three or only one, depending on the needs of the story. Finally, the pieces of glass were fixed to the frame with a thin open hoop, ensuring that they would be guaranteed to slide in the magic lantern slide holder.

The technique for making pictures on glass magic lantern slides scarcely changed with the turn of the century (Fig. 1). Evidence can be found in the manuals devoted to the subject, such as *The Art of Transparent Painting on Glass* (Groom, 1855), *Directions for Transparent Painting on Glass* (1856), *Chrysophoron for Illumination* (1864), *Transparent Painting on Glass in Water, Oil and Varnish Colors* (Rintoul, 1867), or *Magic Lantern: Dissolving View Painting* (1876). To give an example of these, we might take a look at the first one, the text written by Edward Groom. Besides giving a summary of the tools, materials, and operations necessary for painting magic lantern slides, it also included advice as curious as it was practical: "For the execution of these works, daylight is not necessary; indeed, as they are intended for exhibition by artificial light, it is found that the effect of those executed by gas, or lamplight, is preferable to that of those painted by daylight" (Groom 1855, 8).

As regards the tools and materials used in painting glass for magic lanterns, Groom's text offers the following list: "… glasses, frames, a fine pointed pencil and holder, palette knife, brushes, dabbers, rest stick, a round pointed knife, an etching needle, a few pieces of cloth, and water-colours" (Groom 1855, 12). The artist had to know how to distinguish between the two sides of the glass:

> Glass has a rough and smooth side. The means of distinguishing these, is to draw the finger-nail over the surface, when the rough side may be readily determined by the gritty particles which occur sensibly to the nail. As these particles would prevent the colour from lying evenly, the smooth side is that on which the drawing must be made, and the painting executed. For common subjects, that material called flatted crown glass, will be found suitable, but if nicety of execution is necessary, the plate-glass must be used. In all cases, it must be as free from specks as possible, and of the same size as the object-glass of the magic-lantern, through which the pictures are to be exhibited (Groom 1855, 12-3).

The frames on which the glasses were mounted were usually made of mahogany or pine, and could be square, rectangular, or circular. The fine-pointed pencil was used to draw silhouettes and was more comfortable and quick to use than a paint-brush, which had to be made of sable hair; soft to the touch, but firm and elastic. The palette knife was used to mix the dyes, and to place colors on the palette as well as remove them. It had to be thin, flexible and pointed. The palette could be made of unstained porcelain or enameled wood. The colors on the palette were usually arranged thus: "the light and warm colours are placed near where the thumb passes through the palette, and hence the darker and cold colours are continued round the rim. Thus the gall-stone would be placed nearest the thumb, then the rose madder, and, lastly, the blue" (Groom 1855, 26).

The dabbers were made from round paintbrushes of very fine camel hair, and they were used to blur and soften parts of the pictures, for example, the sky. Groom describes the danger of overusing dabbers when painting on glass –which was the same as overdoing softening in oil painting- and therefore he recommends that that size of the dabber should be proportional to that of the painting fragment in question: "Some painters use the point of the fore-finger as a dabber, and when used with dexterity, it is very effective. A serviceable dabber may also be formed by tying a little cotton wool in a piece of soft white kid. All these dabbers may in turn be employed with advantage" (Groom 1855, 38).

Another group of instruments necessary for painting included an easel (a rack easel drawing board), a rest stick (used, as in oil painting, to rest the hand and hold it steady when fine, precise work is needed), a round pointed knife (useful for removing color when the desired effect was white or to create white or colored lines on black surfaces), and an etching needle for creating the effect of tiny strokes of light, for example, on blades of grass.

The colors were the same as the ones used in watercolor painting and were available in tubes. The number of colors available for painting on glass was necessarily limited, since only transparent ones could be used, that is, ones that let the light through: yellow (Aureoline, Gamboge, Italian pink, Gallstone, Indian yellow), red (Madder Lake, Crimson Lake), blue (Prussian blue, Indigo), Burnt Sienna, brown (Madder brown, Vandyke brown), and Lamp black.

Groom's text groups the stages involved in painting into three operations: drawing the outline, coloring, and finishing. To keep the outline intact throughout the different stages, there were basically three possibilities: a) If the image was an engraving, and the glass onto which it was going to be transferred covered it sufficiently, the shortest process was to trace it; b) If the subject of the composition was too large or too small to trace, it had to sketched onto paper of the right size, using, for example the system of ruled squares, and then traced; c) Photography was also of enormous importance in painting on glass. Photographic images could be projected onto the disk and the advantages and opportunities that it offered for capturing faithful views of places, buildings and objects was of incalculable value.

The second operation, coloring, entailed certain problems, since one had to paint with a view to the final visual effect on the projection screen rather than to the immediate result on glass. Furthermore, the choice of pigments was limited, since, as mentioned earlier, they had to be as transparent as possible, and watercolors were still preferred to oils because of their lesser opacity and quick drying time. The same as with any kind of painting, when painting on glass one had to begin by resolving the background in the picture and gradually move to the foreground. Light and shadow had to be more intense in the foreground than in any other part of the composition, because the objects they fall on are in positions closest to the viewer. According to Groom, the strictest attention to detail was required when painting the foreground, where the objects are so close to the eye that their structure and surface are clearly visible:

> By detail, is understood not only a realization of the forms of the nearest objects, by truthful drawing and observation of their light and shade; but also a description of their components, surfaces, and materials. Force, substance, reality, and detail, are primary qualities of foregrounds, inasmuch as they describe objects in immediate proximity, and serve to cause the retirement of the middle and remoter distances (Groom 1855, 35).

To emphasize even further the degree of complexity reached in the coloring process, we can refer to Alexander Nelson Rintoul's 1867 publication, *Transparent Painting on Glass in Water, Oil and Varnish Colors*. Rintoul advised avoiding blues and greenish yellows so that the image would look better when projected. He encouraged the painters to make a complete table of pigments, and offered guidance in how to achieve certain effects with the use of a series of previously mixed colors: to obtain a pigmentation resembling "close-up skin" he recommended a mixture of Indian yellow and carmine, whereas the best way to achieve a "far-away" skin color was with Venetian red and Gamboge, a resin obtained from the tropical tree of the same name. In addition, combining Gamboge with Prussian blue and Indigo gave the best results for distant or close-up greens.

Finishing was the third and last operation required for making magic lantern slides. In this final stage, each part of the picture had to be reconsidered to decide whether it was necessary to soften, blur or intensify any parts to achieve a harmonious overall effect. Once the composition on glass was finished, it had to be protected; this was done mainly through two methods: a) By covering it with another fine piece of glass with the rough part facing the inside. Next, the two pieces of glass were stuck firmly together with a strip of glued paper. To avoid damaging the paint with the glass covering it, a narrow rim of thick paper was placed between the two pieces of glass and stuck on the outside edge of the glass with glue or paste. Previously, when painting, the artist had to be careful to leave the outer rim of the piece unpainted. b) The whole work also could be finished using just the one piece of glass. In this case, the paint was secured using a thin layer of lac varnish or varnish mixed with turpentine. Varnish also could be used along the different stages to fix the colors.

Together with watercolors, oil paints also were used in making compositions on glass, and the techniques were similar, the main difference being only the materials used. The same tools and the same repertory of colors were used, except that Italian pink was used instead of Gamboge because it was richer and more transparent. Indeed, watercolors and oils were sometimes used in combination, with excellent results. The watercolors created a delicate effect, clear and brilliant, whereas the solidity and richness of tone of the oil colors were perfectly suited to certain parts of the composition, such as some elements in the foreground and some figures that required full tonality and pronounced relief.

Thanks to superb painting techniques, some glass slides for magic lanterns resembled works of art. To understand this, it is sufficient to consider the most important images used in the sessions offered during forty years at one of the most famous cultural centers in nineteenth century London, the Royal Polytechnic Institution. Starting with its inauguration in 1838, the Royal Polytechnic offered all types of educational exhibitions, talks, leisure events, and assiduously programmed lectures illustrated with magic lantern views and sophisticated optical shows that combined projected images, sound effects, acting, narration, and music. At the Royal Polytechnic, as many as seven magic lanterns were used at the same time, as well as a good number of accessory devices installed behind the screen for producing sounds such as thunder, wind, or cannon fire. Some of the transparencies used in the institution were exceptionally large, with frames measuring 64 x 25.5 cm holding glass measuring 21.5 x 16.5 cm. Thus, the quality and wealth of detail of the images were matchless. Among the painters hired to make these slides were W. R. Hill (Fig. 2), Edmund H. Wilkie, Charles Gogin, Thomas Clare, E. H. Doubell, Perrin and C. Smith. In fact, when the Royal Polytechnic Institution closed in 1882, and the contents of the building were publicly auctioned, the collection of slides was one of the most desirable lots. Three hundred of them were acquired by E. H. Wilkie, and many of them were handed down to Will Day and currently form part of the collections of the Cinémathèque Française. Also from these holdings were two series that are now in the Museum of the History of Science, Oxford, as well as some other series that are biw ub various public and private collections, such as that preserved in the National Museum of Photography, Film & Television (Crangle, Herbert, and Robinson 2001).

Fig. 2. Hand-painted lantern slide from the Royal Polytechnic Institution. Attributed to W. R. Hill. Size: 27.7 x 27.7 cm. Collection of the Cinémathèque française.

The technique for painting the glass slides of magic lanterns was so laborious that it could take several days to obtain a quality image. It is therefore not surprising that they were

gradually replaced, especially in the last quarter of the nineteenth century, by printing and photographic techniques.

Printing Techniques and Magic Lantern Slides

Printing techniques included a set of methods and processes that can reproduce, stamp, or print images based on a matrix. This matrix can be made of different materials, such as wood, stone, metal, or linoleum, according to the technique or process used; for example, wood engraving, linoleum, dry point, etching, aquatint, copper engraving, silk-screen printing, or lithography.

Owing to the high production costs involved, which also made the commercialization of magic lantern slides expensive, hand-painting was gradually replaced by, or complemented with, mechanical printing of drawings on glass, leaving only the coloring to be done by hand. One of these first mixed procedures for mass manufacturing was used by the English optician Philip Carpenter, who described it in 1823 in his book *Elements of Zoology,* when applying it to illustrate a series of 56 images on glass that represented mammals, birds, amphibians, insects, and other themes from nature (**see back cover**). In his attempt to mass produce them, Carpenter engraved all the outlines and the details of each image on a copper plate. He then applied black ink mixed with varnish on the plates, and printed these outlines on glass. Carpenter's technique was copied by many European firms that manufactured glass slides. This mixed method was offered in their catalogues until well into the twentieth century. For example, the English firm, Brodie & Middleton, included accessories suitable for the personal creation of slides by selling series that were made to be colored at home.

The printing technique most widely used in manufacturing magic lantern slides was lithography, a technique discovered accidentally in 1796 by German printer Aloys Senefelder. It seems that Senefelder had a Kelheim stone plaque on his table that he used to prepare the ink for printing. At a moment when he didn't have paper or pencil at hand, he did some arithmetic on the stone using the ink he had been preparing from wax, soap and soot. To erase the operation he poured nitric acid (which he used to engrave on copper) on the stone. After some minutes had passed, he saw that the nitric acid had corroded the stone except in the area where he had written. The oil from the ink had protected these bands and they appeared in slight relief. Given that the systematic use of this procedure greatly facilitated printing of images, Senefelder himself developed trichrome and quadrichrome processes applied to lithography, thus giving rise to chromolithography. Following Senefelder, other printers, such as William Savage, managed to incorporate up to thirty different colors in their prints.

The procedure for chromolithography, that is, lithography that combined several colors or inks, was based on the use of one plate for each of the colors. One first had to draw the part corresponding to each color on a different stone, which was then tinted with the chosen color. This meant that the artist had to have a very clear idea of the image to be obtained in order to be able to break it down into parts and calculate the number of matrices needed. Of course, it was also very important not to forget that in the definitive print run, when two colors are superimposed, a third color is obtained. To break down the drawing, the simplest procedure consisted of making a drawing on paper and then, using tracing paper, transferring to each of the stones the outline corresponding to the areas meant to have the same color. A quality color print had perfectly registered colors.

The method that worked best for manufacturers of glass slides was the use of a small chromolithograph printed in transparent colors that was then stuck onto the pieces of glass simply by wetting it slightly. The procedure, known as "transfer" or "decal," was also inspired by a technique invented by British printers Sadler and Green at the end of the 1750s to transfer printed images to ceramics. Colorful transfers made with cold water required porous paper covered in a solution of starch, albumin, and glycerin, onto which the colors were printed, first the details and then the background, and a coat of glue was used to finish it. The paper was then moistened and placed on the glass, and after a few seconds the image is transferred to the glass. Then the paper had to be removed and the transfer examined to see if it had stuck properly to the glass.

In Great Britain around 1870, the manufacturer J. Barnard & Son industrially produced the first really successful decal transparencies in full color. The decals were printed in enameled inks that were subsequently cooked once the illustrations had been transferred to the glass. The pieces of glass were circular, and mounted in mahogany frames measuring 7 (17.78 cm) x 4 (10.16 cm) inches, covered by protective glass that was in turn held in place by a metal ring.

Fig. 3. Magic lantern slide decorated with the printing technique from the London firm of W. Butcher & Sons (Primus 'Junior Lecturers' nº 776). Title of the series comprising 24 slides: *Alice in Wonderland*. Size: 8.3 x 8.3 cm. Collection of F. Boisset and S. Ibáñez.

After 1885, when magic lantern slides measuring 8.25 cm long flooded the market, a size that had become a kind of "standard" for the chassis of the projector, the popularity of decal slides for magic lanterns rose sharply. For example, in 1892, the stock of the firm Theobald & Co. was estimated to be between two and three million units, and the London Company W. Butcher & Sons (1870–1906) commercialized this kind of slide with the trademark "Primus" under the "Junior Lecturers" series (Fig. 3). With approximately a thousand titles to choose from, the "Junior Lecturers" series were sold as games that included eight glass slides protected inside a cardboard box. Some slide games contained funny stories and children's stories. Many of them contained printed texts on the slides themselves, and other collections included printed explanations in the form of notes for a talk. Longer stories required two or more chapters, and thus another set of eight slides per chapter. The pieces of glass were covered by a thin piece of protective glass and framed in black paper ribbon. The images were framed with black paper that marked them out in circular form or in squares with rounded corners. Slides produced by decal transfers also were the most common type of slide made by German toy magic lantern manufacturers in the second half of the 19th century (Fig. 4).

Fig. 4. 19th century German decal-type toy lantern slide. Wells collection.

Often the sources of inspiration for the images on the slides came from printed illustrations, a medium that had been developing in parallel to the magic lantern and with which it had much in common. Indeed, the print media, ranging from postcards to caricatures to newspaper illustrations and comic strips, had the same urban, industrialized and literate audience that enjoyed the magic lantern, an audience that congregated in the sitting rooms of their homes to project domestic magic lantern sessions, to leaf through illustrated publications, or to listen to readings of episodes of serialized popular literature.

An example of how the printed stories migrated to magic lantern slides can be found in the work of Wilhelm Busch. Besides making history by creating the naughty duo known as Max and Moritz in 1865, Busch drew, among other comic strips, those of *Diogenes und die bösen Buben von Korinth* (Fig. 5) or *Maler Klecksel*, which show how many of their adventures served as a model for printing numerous collections of magic lantern slides. The fact that Busch did not use borders on the comic strips, and very rarely text balloons—

Fig. 5. Illustration by W. Busch from the series *Diogenes und Die Bösen Buben von Korinth* (1863) and two magic lantern slides from different collections with the same image. Collection of F. Boisset and S. Ibáñez.

when they did appear, they were located underneath the drawings–explains in part how easy it was to adapt his works to the visual style of the magic lantern, and thus the interest of manufacturers in making slides of his comic strips.

Photographic Techniques and Magic Lantern Slides

Practically all systems for developing photographic negatives in the nineteenth century were changed to permit printing on glass slides. Depending on the format of the negative, there were two methods for obtaining the positive image: a) If no reduction or enlargement were necessary, then the slide could be printed by contact; that is, by superimposing the negative directly on the glass or using a copying medium. b) If the format of the negative had to be adapted for the slide, a copying camera had to be used. This consisted of a long box that held the negative at one end, had a lens in the center to focus the image, and a device at the opposite end to hold a piece of glass at the right distance for receiving a positive image in the required size.

The first commercial photographic magic lantern slides were made by brothers William and Frederick Langenheim in the United States in 1850. Their preparation depended on a developing process based on superimposing albumin on glass, invented by Abel Niépce de Saint Victor in 1848. The process was patented under the name hyalotype, very similar to the crystallotype patented by J. A. Whipple of Boston. On occasion, the hyalotype process was also used to make larger pieces of glass that could be placed in windows and doors for decorative purposes. Owing to its long exposure time, albumin was soon replaced with collodion for making photographic negatives. Nonetheless, albumin's capacity for high translucence and excellent definition meant it was still used to produce slides for both the stereoscope and the magic lan-

tern until well into the twentieth century, especially in France and Great Britain, by companies such as Negretti & Zambra.

Starting in 1857, the manufacturers of photographic slides for magic lanterns adopted the wet plate collodion developing process invented by Frederick Scott Archer, a procedure that facilitated taking negatives and brought way down the cost of creating positive slides. The process consisted of taking clean glass and poring over it a fine layer of collodion (nitric cellulose dissolved in ether) and then sensitizing it with silver nitrate. The exposure of the image had to take place while the solution stayed wet. This procedure posed no problem as regards the industrial production of slides, and therefore collodion was the principal method for developing associated with the manufacture of magic lantern slides until the first decade of the twentieth century. For photographers, however, the preparation of negatives on site was complicated, so many amateurs experimented with dry collodion developing, attempting to preserve the speed of the wet collodium process. Some of these dry collodion developing processes, such as the one based on tannic acid invented by the Englishman Charles Russell, were applied rarely in the manufacture of magic lantern slides.

In any of its forms, collodion provided a simple process for reproducing the finest details. Such was the case that John Benjamin Dancer used it to produce microphotographs that could be seen under a microscope or projected onto a screen. Thanks to this procedure, his firm was able to put on the market more than five hundred different images. Dancer used a magic lantern and a microlens–a lens to reduce instead of enlarge an image—to produce fine grain collodion microphotographs from conventionally sized negatives. These tiny microphotographs, some as small as 0.8 mm, generally done on glass, were normally viewed through a microscope. The first projections of microphotographs that we know of took place during the Franco-Prussian War between 1870 and 1872. A series of messages converted into microphotographs and transported by carrier pigeons served to establish a vital link between the besieged city of Paris and the rest of France. When they arrived at their destination, these microscopic slides were "deciphered" by projecting them with a magic lantern so their transcribed messages could reach the besieged citizens.

Although its results were of lesser quality, carbon-based developing was applied with equal success by amateur photographers and manufacturers of magic lantern slides. This system, which worked only on photographic positives, was invented in 1855 by A. L. Poitevin in an attempt to obtain durable copies, but did not become popular until J. W. Swan introduced prefabricated carbon plates around 1864. Since the positive image was formed on a film of gelatin, the carbon images could be transferred to any surface, including a thin plate of glass. The color of the slides could be changed using different carbon pigments. Carbon images were not made based on photographic granularity, but thanks to variations in the thickness of the pigmented gelatin layer. Since this layer is extremely thin and translucent, the developing procedure adapted perfectly to the needs of projection. The photographic process invented by Walter B. Woodbury in 1865 followed the same principle. The difference was that the carbon pictures were photographs produced through exposure, whereas those made using the Woodbury method came off a printer. In around 1870, Woodbury began to use his method in his own company in the manufacture of magic lantern slides, and a short while later it was used by the concessionary firm of J. Carbutt, the American Photo-Relief Printing Company, located in Philadelphia.

Amateur photography received a boost with the introduction of the dry gelatin plate, whose speed and easy handling made it the starting point for snapshot photography a little before 1880. However, the gelatino-bromide emulsion plates that were used successfully to develop negatives were not good for photographs destined for projection, because the grain was too thick and the projected picture of poor quality. The use of a dry plate covered in gelatino-chloride of silver was adapted for work on glass by J. M. Elder and G. Pizzighelli in 1881. After that, different manufacturers, such as the British firms of Edwards, Ilford, and Thomas & Co.; the Germans Unger & Hoffmann and Perutz, as well as Kodak and Lumière, began to produce their own magic lantern slides. Unlike development with collodion, the gelatin plates could be coated mechanically and sold at comparatively affordable prices. With these improvements, customers could buy prefabricated plates and chemicals for photographic developing, such that they only had to expose the glass and process the image. If one wished, the picture could be colored with a single color that ranged between blue and red-sepia.

Although most experts considered the quality of gelatin slides to be slightly inferior to those processed with collodion, the impact of the use of the gelatin plate on amateur projection photographers was twofold: on the one hand, as a negative process, it increased the number of photographs; on the other, in regard to positives, it simplified the production of slides. Thus, the practice of projecting one's vacation pictures to family and friends was able to take its first steps. However, the new photographic techniques did not just stimulate the imagination of amateurs. The American photographer Alfred Stieglitz, who fought hard to make photography an art form on a level with painting and sculpture, used glass a medium for some of his most famous works. A good example of this is *Winter on Fifth Avenue,* which according to the photographer himself was taken in New York in 1893, after waiting almost three hours in a spectacular snowstorm (Fig. 6).

Techniques for registering photographs on glass also made possible the famous Life Models, collections of slides with images of "natural models" that were commercialized by Bamforth & Co. in England starting in 1870, and in the

Fig. 6. *Winter on Fifth Avenue* (1893). Three images from the work of Alfred Stieglitz that show that they were produced as lantern slides using photographic printing techniques. Collection of the George Eastman House.

United States by the New York firm of Scott & Van Altena. The Life Models collections consisted of slide sets of up to 50 units, mostly colored in by hand, that showed figures in very elaborate sets, dramatizing stories that had to be completed with texts inscribed on the slides themselves or by a narrator (Fig. 7).

The amount and the diversity of magic lantern slides produced over more than two centuries was such that by the end of the nineteenth century, the catalogues published to bring together the supply of commercialized slides came to have more than 1200 pages containing an inventory of approximately 200,000 slides. These catalogues offer proof that the three techniques for registering images on glass slides—painting, printing, and photography—survived together until the decline of the magic lantern in the first decade of the twentieth century, although the first of these was in continual crisis, as can be deduced from the following fragment of an article entitled "A Dead Industry" (*The Engineer* 1894, 439):

> Practically speaking, photography has about killed lantern slide painting as an art, although colorists are now numerous... Westley, of the firm of Carpenter & Westley, encouraged those who had skill in the work, among whom were Messrs. S.H. Baker, J. Smith, Thomas Clare, Thomas Kearnan, the cleverest painter of architectural slides; Henry Childe, an expert at scenic effects such as rippling water, summer and winter landscapes, and moonlight effects; Charles Simpson, a miniature painter by profession, and C. Constant, who made himself immortal by painting the original of the world famous slide of the sleeping man swallowing rats.

Fig. 7. Photographic magic lantern slide of the life model type by James Bamforth. Title of the series comprising 10 slides: *Tit for Tat.* Size: 8.3 x 8.3 cm. Collection of the Cinémathèque française.

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The Magic Lantern Society of the United States and Canada

Announces Its Third Annual

$500 Student Essay Award

The Magic Lantern Society of the United States and Canada is pleased to announce its third annual Student Essay Award contest.

The award has been created to invite the participation of young scholars, archivists, and artists in research on the magic lantern. We welcome submissions related to the culture, practice, and study of the lantern, from the 1600s to the present, anywhere in the world, but most especially in America or Canada.

Entrants must be enrolled in a graduate or undergraduate academic program at the time of submission. Students may submit essays originally written for academic courses, but may not submit anything previously published in print or online. Submissions should be written in English and should not exceed 5,000 words.

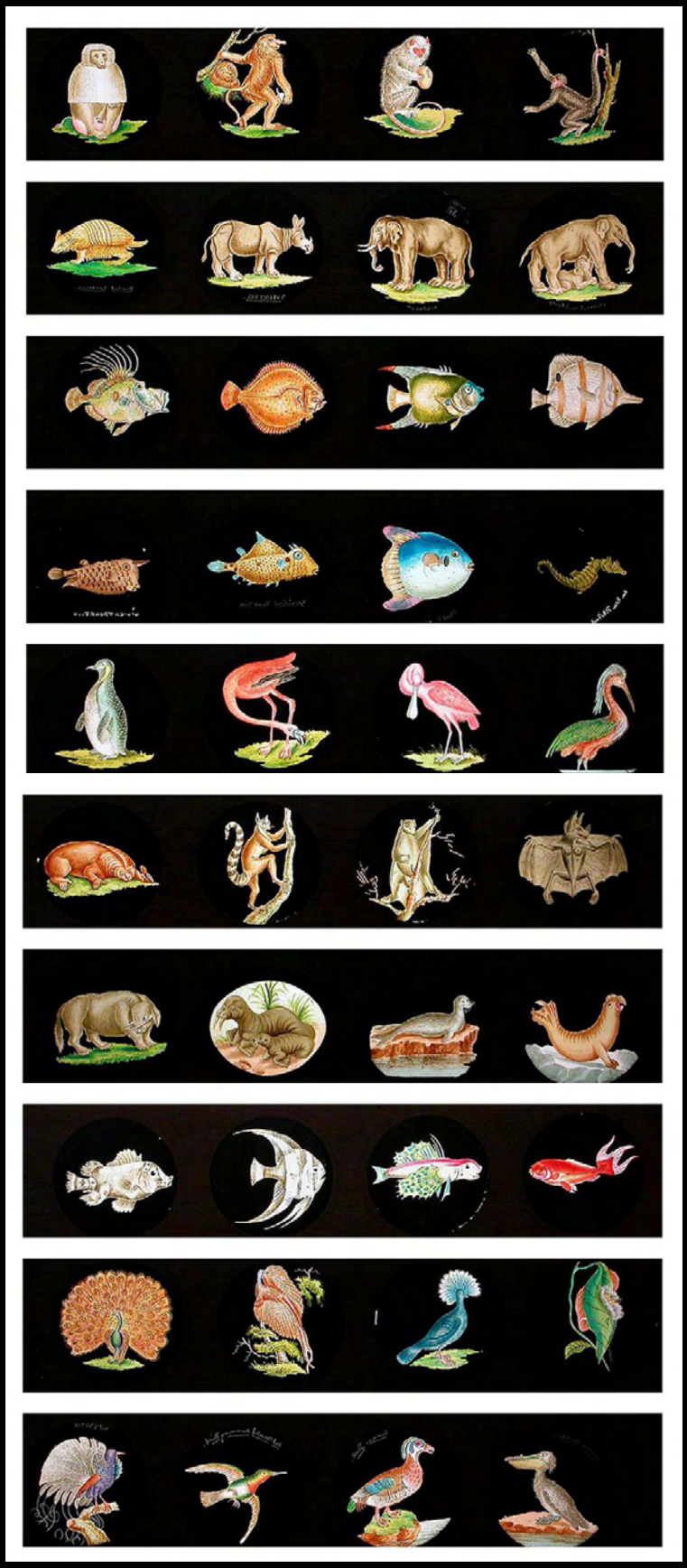
All submissions are due electronically by April 1, 2014.

A committee of the Society will select the winner. The award, which consists of a monetary prize of US $500, will be announced on June 1, 2014, and the essay will be published soon thereafter in *The Magic Lantern Gazette*, the Society's print and on-line research journal. The winner also will be invited to make a presentation at the Society's Convention, to be held near Boston on July 10-13, 2014.

Please send your submissions (in Microsoft Word format) to the editor of *The Magic Lantern Gazette*:

Kentwood Wells (kentwood.wells@uconn.edu)

To review back issues of the *Magic Lantern Gazette*, please visit **http://library.sdsu.edu/scua/online-materials/magic-lantern-pubs/gazette**



Twelve hand-painted magic lantern slides with illustration outlines printed by copper-plate engraving by the London firm of Carpenter & Westley. Collection of F. Boisset and S. Ibáñez.

Front Cover: 19th century English hand-painted slide. Wells collection.