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# The Meaning Of A Moment : An Analysis Of The Photomicrographs Of Dr. Max Poser In Response To Their Physical Location And Trajectory

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# THE MEANING OF A MOMENT:
# AN ANALYSIS OF THE PHOTOMICROGRAPHS OF DR. MAX POSER IN RESPONSE TO THEIR PHYSICAL LOCATION AND TRAJECTORY

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**ABSTRACT**

Dr. Max Poser was a researcher, scientist, and lecturer in the fields of ophthalmology and physiological optics at the New York based optics company, Bausch & Lomb. This thesis examines a group of his silver gelatin photographs located at George Eastman House and compares this series of 1930s photomicrographs to other images by Dr. Poser at the Bausch & Lomb archive. This thesis contextualizes the photographs within the history of photomicrography, the biography of Dr. Poser, and his work at Bausch & Lomb to understand why these photographs were made. Several of these photomicrographs were exhibited and published before arriving at the museum, and these frameworks show how the usage of a photograph can change how it is understood. Finally, the thesis examines the physical locations where each of the objects is kept and how those locations generate different connotations that reflect the mission of each institution.

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**ILLUSTRATIONS**

## Chapter One: Introduction

Photographs of microscopic objects, or photomicrographs, have been made since the beginning of photographic practice. Since then, photomicrographs have become an indispensable tool for research in many fields including chemistry, biology and ophthalmology. Researchers and professionals have utilized this type of photography to reveal and record part of the world that would otherwise remain unseen. Throughout the nineteenth and twentieth-centuries new methodologies and tools became available to practitioners of photomicrography, increasing the quality and quantity of images. In addition, both professional and amateur microscopists created photomicrographs in the 1930s, as microscope technology became widely available through optics companies such as Bausch & Lomb. Dr. Max Poser, an employee of Bausch & Lomb, is a good example of a scientist and photographer who used photomicrographs as both tools for studying the human eye and as aesthetic objects.

Photographs do not belong to a specific discourse; for the purposes of this thesis I used the term discourse as defined by Michel Foucault as being a sum of ideas, concepts and social practices relating to a subject or field. Photographs can become a part of many discourses depending on their use and presentation, a concept presented by Rosalind Krauss in her essay "Photography's Discursive Spaces."[1] This thesis will use a collection of Dr. Poser's photographs located at George Eastman House, International Museum of Photography and Film (henceforth Eastman House) as a case study to explore how the physical location and use of a photograph alters the history of the object and makes it a part of more than one discourse. The thirty-one images were originally created as part of his work in ophthalmology and microscope technology development for Bausch & Lomb. Bausch & Lomb published and exhibited the photographs to promote the activities and products of the company. Then, the photographs arrived at Eastman House after appearing in a travelling exhibition about scientific and applied photography in 1937. This thesis compares these objects to a variant collection of Dr. Poser's photographs currently located in the Bausch & Lomb archive; these photographs were constructed to be displayed in the same manner but did not appear in the 1937 exhibition. The exploration of the contexts in which these two groups of photographs were included will act as the basis for examining how the transition of objects as they are moved from place to place, the location of the objects, and the treatment those objects receive at different locations affects the meaning given to the objects and alters their history. This consideration of how the understanding

[1] Rosalind Krauss, "Photography's Discursive Spaces: Landscape/View," in *Art Journal* 42 no. 4 (Winter 1982): 311.

of an object changes relative to its historical trajectory and physical location suggests that the historian should be increasingly conscious of how a photograph becomes part of a particular discourse and how that discourse becomes associated to the object in the history of photography.

This thesis is divided into several sections that place Dr. Poser's work within the history of photography and science in order to determine the role of his photomicrographs in different historical contexts. It begins with an analysis of the literature on scientific photography and photomicrography that shows how scientific photographs fit into the history of the photography. The representation of scientific photographs and the dissemination of ideas in a public forum are briefly summarized to clarify how these particular images differ in purpose from photographs created for commercial or aesthetic reasons.

This thesis then analyses the specific physical trajectory of this collection of photomicrographs, including a comparison of exhibitions that featured Dr. Poser's work and those that did not. An outline of the history of photomicrography, background information regarding the professional career of Dr. Poser as a scientist and photographer and the history of Bausch & Lomb is presented to create a foundation to understand the initial purpose of this particular body of work. These sections provide the background history necessary to understand the context in which these objects were made.

This thesis will then look at how Dr. Poser's photographs have been utilized for many functions, including exhibition and publication. To frame these functions, exhibitions from the 1930s, the period in which Dr. Poser's photographs were made, will be examined to highlight the differences between the exhibitions that displayed Dr. Poser's photographs and other photography exhibitions featuring photomicrographs. This comparison also reveals how photomicrographs were consumed within the context of photography exhibitions relative to non-scientific photographs. The presentation of Dr. Poser's images in two different types of exhibitions will reveal that they functioned as both records of scientific information and as aesthetic objects. Finally, a specific analysis of one of these exhibitions of scientific and applied photography, where the photographs now housed at Eastman House were first shown, furthers this discussion as this instance of usage affects how these photographs are currently viewed and understood compared to those stored at the Bausch & Lomb archive, which have not been exhibited.

Lastly, this this thesis explores how an institution that a photograph is located within affects how the object is understood by comparing the treatment of the photographs held by Eastman House, a museum, to those held by Bausch & Lomb, a corporate archive. Each of the two locations has

different missions and goals, and this is reflected in how the objects in their collections are handled and used. This comparison reveals how the audience for each of these places differs and how the institution's use of the objects gives them new meaning. The comparison also shows that when photographic objects are part of a collection they acquire meaning from the purpose or mandate of the institution. In addition, the treatment of the objects within the space, whether it is the storage space or exhibition space, provides the audience with clues as to how to read them.

The purpose of this analysis of Dr. Poser's work and its historical trajectory is to bring forward the role of physical location and use in the development of an object's meaning. Photographs are objects that have, in many cases, lived through time as commodities that have been traded, sold and moved from place to place. With each transaction each photograph retains old and gains new meanings, and in many cases this historical trajectory and the different discourses each object was associated with become lost or unknown. In addition, objects collected by museums have an automatic importance placed upon them because they have been deemed worth collecting and storing; this perceived value may not be the same if the image was found in an archive or flea market. In rare cases, such as the case of the photomicrographs by Dr. Poser, the movement of the images and objects is traceable, and some of the original situations and subsequent meanings that the objects were a part of can be re-established. Through the comparison to other photographs in similar historic contexts including their use, a deeper understanding of Dr. Poser's images is established. As positive as the rediscovery of these object's use and context is, it would not have happened if these objects were not selected for an in-depth study. Thus, the ultimate discovery of this thesis is that the treatment of objects within a museum also adds another layer of meaning, either through research and exhibition of the work or the lack of study and importance placed upon it.

## Chapter Two: Literature Review

To be able to place Dr. Max Poser's photomicrographs within several historical contexts an overview of the various discourses is required. Dr. Poser's 1930s photomicrographs are not extraordinary examples of microscopy or photography; however, the presentation of the photographs in early science and technology exhibitions brings forth the question of how scientific knowledge was distributed to the general public in the 1930s and addresses what role photography exhibitions played. In this section I have summarized and evaluated scientific photography and the dissemination of scientific ideas in order to determine how these fields apply to the photographs by Dr. Poser. In addition, I explored theories regarding the alteration of meaning to photographic and non-photographic objects due to a change of physical location and relate this information to Dr. Poser's photographs and their historic trajectories.

The work of Dr. Poser cannot be understood without a thorough investigation of the role he played in the Bausch & Lomb company and how his work at the company contributed to the field of ophthalmology. The archive at the Bausch & Lomb company in Rochester, New York holds a number of employee records for Dr. Poser along with correspondence and photographs that offer insight into his work and career. The archive also provides information regarding the history of Bausch & Lomb that is separate from the official publications of the company, such as *The Story of Bausch and Lomb*, a biased view highlighting the importance of Bausch & Lomb to the United States of America.[2] In contrast, Lee Sullivan's *A Brief History of Bausch & Lomb's First 150 Years* provides a neutral overview of the achievements of the company that allows Dr. Poser's work to be placed within the history of the company.[3]

A number of texts that were surveyed focus on the link between science and photography in the nineteenth-century to gain perspective of early photographic representations of science. Ann Thomas's *Beauty of Another Order* looks at the variety of different types of scientific photography in the nineteenth-century, including medical and astronomic photography; however, the book does not focus on photomicrography in particular.[4] The multiple chapters in this volume illustrate the question of whether or not the photograph creates an accurate representation of the phenomenon captured. This is a theme that is also present in *Nature Exposed: Photography as Eyewitness in Victorian*

[2] Bausch & Lomb Optical Company, *Story of Bausch & Lomb* (Rochester, NY: Bausch & Lomb, 1940).
[3] Lee Sullivan, *A Brief History of Bausch & Lomb's First 150 Years* (Rochester, NY: Bausch & Lomb, 2004).
[4] Ann Thomas, *Beauty of Another Order* (New Haven: Yale University Press in association with the National Gallery of Canada, 1997).

*Science* by Jennifer Tucker.[5] Tucker addresses how an audience consumes scientific photography and suggests that the consumption of photographs makes them more significant than other scientific photographs that have not been displayed. She primarily reports on the exhibitions and lectures of scientific topics to scientific communities, rather than presentations to the general public, but she does state that scientific exhibitions that included photography assisted in the creation of a discourse that lay between science and visual culture. Tucker's essay "The Social Photographic Eye" in *Brought to Light: Photography and the Invisible, 1840-1900* edited by Corey Keller, examines the nineteenth-century display of scientific photographs, including photographs created to generate wonder for an audience through scientific images.[6] She highlights the struggle of early scientific practitioners to create standardized methods within their fields of study for recording their findings and hypothesizes, which led to the cornucopia of display and dissemination methods used by early scientists. Finally, in her book *Photography and Science*, Kelley Wilder addresses the aesthetic qualities of photomicrographs and the use of those images as illustrations for both scientific and non-scientific purposes.[7]

The study of the display of scientific subjects, including photomicrographs, would not be complete without an examination of the types of scientific exhibitions that did not include photography leading up to the 1930s. Bernard Lightman's *Victorian Popularizers of Science* looks at a variety of media and spectacles based on scientific discoveries created in the nineteenth-century to draw in and delight audiences.[8] These presentations include multiple methods for the dissemination of scientific information including visual displays, publications and lectures. Along with Lightman, Aileen Fyfe expands upon the dissemination of scientific images in the nineteenth-century with *Science in the Marketplace*, concentrating on the audience's use of these displays and how scientific exhibitions and objects entered into consumer culture.[9] These volumes provide a means to understand how the exhibition of scientific display evolved in Great Britain. Along these same lines, David Knight's *Public Understanding of Science* examines the dissemination of scientific ideas in the United States along with how other forms of popular science and culture, such as science fiction,

[5] Jennifer Tucker, *Nature Exposed: Photography as Eyewitness in Victorian Science* (Baltimore: Johns Hopkins University Press, 2005).

[6] Corey Keller, *Brought to Light: Photography and the Invisible, 1840-1900* (New Haven: Yale University Press, 2008).

[7] Kelly Wilder, *Photography and Science* (London: Reaktion Press, 2009).

[8] Bernard Lightman, *Victorian Popularizers of Science: Designing Nature for New Audiences* (Chicago: University of Chicago Press, 2010).

[9] Aileen Fyfe and Bernard Lightman, *Science in the Marketplace: Nineteenth-Century Sites and Experiences* (Chicago: University of Chicago Press, 2007).

assisted in creating interest for academic science.[10] This book provides a view into the public's interest in science during the early to mid-twentieth-century.

A background to a history of scientific representation is required in order to understand the methods used to display Dr. Poser's photomicrographs. Jennifer Lee and Miriam Mandelbaum's book, *Seeing is Believing* provides an overview and history of scientific illustration from early drawings to photography, including an evolution of the practices and processes used for representing scientific ideas.[11] Michael Lynch and Steven Woolgar address the variety of methods of scientific representation in their book, *Representation in Scientific Practice*.[12] The essays within Lynch and Woolgar's volume examine the role of the photograph in science, evaluate its effectiveness in conveying information, and address how the method of photographing scientific subjects has changed. This text suggests that in order for the photograph to be an effective tool in scientific research, it must be paired with other forms of scientific depictions such as graphs, diagrams and tables in order to be empirically relevant. Although the subject of effective conveyance of scientific ideas may not seem relevant to the photographs of Dr. Poser, it does demonstrate the method that Dr. Poser was using to represent his subjects that were not necessarily intended for scientific research. David Topper's article "Towards an Epistemology of Scientific Illustration" in *Picturing Knowledge* examines scientific illustration from an art historical perspective and states that the visual presentation of scientific subjects in the nineteenth-century utilizes traditional art conventions and modes of presentation.[13] This text is particularly useful for understanding the transfer of imagery from scientific documentation to public exhibition.

Dr. Poser's photographs were not created to provide in-depth information regarding his subjects or to emphasize the aesthetic value of the image; rather, he sought to show the value of photomicrography as a method of discovery and a way to present his findings in a visual form. Studies on modern methods of disseminating scientific information to both the public and scientific community were not prevalent until the 1950s, creating a lack of information regarding the dissemination of photomicrography in the 1930s. There have been many studies since then that discuss scientific publications from the early twentieth-century and analyse the style and function of

[10] David M. Knight, *Public Understanding of Science: A History of Communicating Scientific Idea*s (London, New York: Routledge, 2006).

[11] Jennifer B. Lee and Miriam Mandelbaum, *Seeing is Believing: 700 Years of Scientific and Medical Illustration* (New York: New York Public Library, 1999).

[12] Michael Lynch and Steve Woolgar, eds. *Representation in Scientific Practice* (Cambridge: MIT Press, 1990).

[13] David Topper, "Towards an Epistemology of Scientific Illustration," in *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science*, ed. Brian S. Baigrie (Toronto: Toronto University Press, 1996).

text and illustrations. Sources that reflect on communication methods, such as Brian Vickery's *Scientific Communication in History*, show that the general public's interest in scientific journals, popular science magazines, conferences, public programming and other formats increased during the twentieth-century.[14] In contrast to Vickery, Benjamin S.P. Shen states in his article, "Science Literacy and the Public Understanding of Science," that the increased specialization of the sciences in the early twentieth-century resulted in a lack of dissemination of information to the public due to inaccessible jargon and possessiveness over scientific findings.[15] While this may be have been true for advanced scientific research and publication in the first half of the twentieth-century, general interest in science was growing, demonstrated by the increased consumption of popular science magazines. In his article "Making Science Visible: Visual Literacy in Science Communication," Jean Trumbo states that in order for an audience to understand a scientific illustration, a certain level of visual understanding is necessary.[16] While there were no studies conducted regarding the public's consumption of photomicrographs in the 1930s, photomicrographs were published in a number of media and the general public had the visual vocabulary necessary to understand what was a photomicrograph.

The subject of how multiple meanings are imposed on an object through its physical movement or trajectory in relation to the work of Dr. Poser is one that I will explore and evaluate in the thesis. In academic literature, the importance of the location and the materiality of the photographic object that has been addressed by scholars, most notably by Glenn Willumson in his essay, "Making Meaning: Displaced Materiality in the Library and Art Museum."[17] Willumson claims that to understand the true nature of an object one must consider the transition of the object through space and over time, and the relation of the object to its surroundings. This idea was first presented in Arjun Appadurai's introduction to *The Social Life of Things: Commodities in Cultural Perspective*, published in 1988.[18] There, Appadurai presents the idea that the movement of an object alters its meaning and use, and that such physical transitions of the object are important to an object's overall life. In this same book, Igor Kopytoff's chapter, "The Cultural Biography of Things,"

[14] Brian C. Vickey, *Scientific Communication in History* (Lanham, MD: Scarecrow Press, 2000).

[15] Benjamin S.P. Shen, "Science Literacy and the Public Understanding of Science," in *Communication of Scientific Information*, ed. Stacy B. Day (Basel: S. Karger AG, 1975).

[16] Jean Trumbo, "Making Science Visible: Visual Literacy in Science Communication," in *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*, ed. L. Pauwels (Hanover, NH: Dartmouth College Press, 2006).

[17] Glenn Willumson, "Making Meaning: Displace Materiality in the Library and Art Museum," in *Photographs Objects Histories*, ed. Elizabeth Edwards and Janice Hart (London, New York: Routledge, 2004).

[18] Arjun Appadurai, Introduction to *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 1988).

illustrates this idea in the art world using the example of African artefacts and how their transfer to an art museum changes their function.[19] He looks at the transit of an object through time in relation to its cultural and monetary value. William Straw furthers this study to include the commodification of cultural objects and their movements through space, time and context in *The Thingishness of Things.*[20] I also reviewed literature that explored how physical location can influence the discourse of an object kept in that location. *Museums and the Interpretation of Visual Culture* by Eilean Hooper-Greenhill examines through case studies how museums address visual culture, and how the context of the object could be retained in an institutional setting.[21] Likewise, Rosalind Krauss describes how photographs belong to different discourses in her influential essay "Photography's Discursive Spaces: Landscape/View" published in *Art Journal* in 1982.[22] That the same year, Christopher Phillips wrote "The Judgement Seat of Photography," published in *October*, which reflects on the museum's influence on the meaning of a photograph through its presentation.[23] The review of literature regarding the influence of physical trajectory and location provided a framework in which to understand the journey and uses of Dr. Poser's photographs.

Dr. Poser's photographs are an example of how photographic objects can be used in diverse ways, for numerous purposes. Using the literature I reviewed, I place Dr. Poser's photographs within the history of photography and reflect on the way his photographs have been understood over the course of their history and at different physical locations. In this way, the different uses over time of Dr. Poser's photographs can be explored by situating Poser's photomicrographs within their social, professional and historical contexts.

[19] Igor Kopytoff, "The Cultural Biography of Things," in *The Social Life of Things: Commodities in Cultural Perspective*, ed. Arjun Appadurai (Cambridge: Cambridge University Press, 1988).

[20] William Straw, "The Thingishness of Things," *Invisible Culture* 2 (1998) http://www.rochester.edu/in_visible_culture/issue2/straw.htm (accessed July 20, 2012).

[21] Eilean Hooper-Greenhill, *Museums and the Interpretation of Visual Culture* (London, New York: Routledge, 2000).

[22] Krauss, "Photography's Discursive Spaces," 311-319.

[23] Christopher Phillips, "The Judgement Seat of Photography," in *October* 22 (Autumn 1982): 27-63.

## Chapter Three: History of Photomicrography

Microscopes provide a way to magnify and enlarge objects too small to be seen by the naked eye. Since the invention of the microscope in the seventeenth-century, an effective and accurate method to record and document observations seen through the microscope has been sought.[24] Observations were first recorded manually by hand; the product of this process is called a micrograph. Around the middle of the nineteenth-century, that process was largely replaced by photomicrographs, which are photographs of observations through the microscope using a camera and photographic chemistry.[25]

Early microscopists found it a challenge to record observations, and often their findings were challenged by colleagues who claimed that their hand-drawn illustrations were too inaccurate to verify their scientific discoveries.[26] As a new method was needed to create more precise recordings, the camera lucida was employed so that microscopists could view the specimen and drawing simultaneously (see Figure 1).[27]

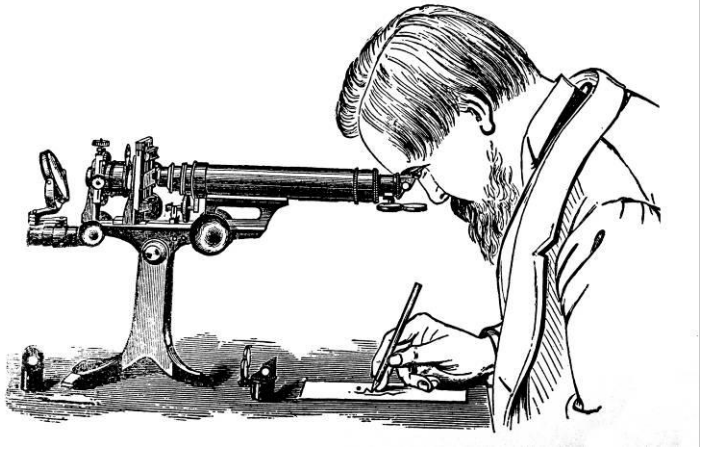

**Figure 1 - Microscopists using a camera lucida.**

The camera lucida was an improvement to the problem of recording images seen through a microscope, but microscopists still sought out a better solution. Microscopists wanted a method to project the image of a specimen being viewed so that they could trace over it to create an accurate representation. In 1743, Henry Baker invented a solar microscope that was modelled upon the camera

[24] Eastman Kodak Company, *Photography Through the Microscope* (Rochester, NY: Eastman Kodak Company, 1952): 2.

[25] Ibid. This should not be confused with microphotographs, which are microscopic prints or negatives of non-microscopic objects.

[26] Ibid.

[27] The camera lucida is an optical instrument that allows one eye to see the specimen and the other to see the paper, optically creating a mixture of the two scenes for the practitioner. Michael W. Davidson, Scott Olenych, and Nathan Claxton, "Photomicrography," in *Focal Encyclopedia of Photography: Digital Imaging, Theory and Applications, History, and Science*, ed. Michael R. Peres, 4th ed. (Boston: Focal Press, 2007): 592-602.

obscura.[28] Solar microscopes project an enlarged image of a slide lit by sunlight into a darkened room, much like a magic lantern.[29] Based on these previous inventions, George Adams invented the first projection microscope illuminated with an oil lamp in 1771.[30]

There were many improvements to the microscope in the nineteenth-century, particularly the projection microscope, which aided in the development of photomicrography.[31] As microscopy technology improved, there was an increasing need for a new reliable method for recording scientific illustrations of microscopic subjects. This need was met with the invention of photography. The first individuals to explore photomicrography techniques were Thomas Wedgwood and Sir Humphrey Davy, whose experiments were published by the Royal Institute in 1802.[32] Their process utilized a solar microscope that projected the magnified specimen onto paper that had been rendered light sensitive with silver chloride, but the images faded due to the lack of a fixing agent, a common problem during this period of photographic invention.[33]

In his 1839 speech to the Chamber of Deputies, Dominique François Arago presented the first published photographic process, the daguerreotype.[34] He emphasized the value this process had for scientists and how it removed errors and judgment from observation.[35] The daguerreotype rendered the fine detail and precision that is necessary for specific observation through a microscope; thus, the daguerreotype process, with its accurate and indisputable recordings, began the marriage of science and photography. The most notable disadvantage of the process at that time was that it only produced a single plate, so an engraving or etching had to be created if multiple copies were required. This created an extra step in the dissemination of scientific ideas through publication, and slowed down the rate of sharing scientific findings.

[28] The camera obscura is a predecessor to the modern analogue camera. With camera obscuras the scene is projected onto a screen inside a dark room or box. Davidson, Olenych, and Claxton, "Photomicrography," 592-602.

[29] The magic lantern is an early device used to project images. Normand Overney, and Scott Overney, "The History of Photomicrography," in *Microscopy UK* (March 2011). http://www.microscopy-uk.org.uk/mag/artmar10/go-no-history-photomicro.html (accessed February 20, 2012).

[30] Davidson, Olenych, and Claxton, "Photomicrography," 592-602.

[31] Carole Troufléau-Sandrin, "Microscopes," in *Brought to Light: Photography and the Invisible 1840-1900*, ed. Corey Keller (New Haven: Yale University Press, 2008): 29–30.

[32] J.T.H. Connor "Photomicrography," in *Encyclopedia of Nineteenth Century Photography*, ed. John Hannavy (New York: Routledge, 2008): 1120-22.

[33] R. Litchfield, *Tom Wedgwood the First Photographer* (London: Duckworth and Sons, 1903).

[34] A daguerreotype is a direct positive image created with a camera on a piece of copper that has been covered with silver and rendered light sensitive.

[35] Troufléau-Sandrin, "Microscopes," 29–30.

Around the same time as Arago's presentation on the daguerreotype process, William Henry Fox Talbot, an early practitioner and inventor of photographic processes, utilized a solar microscope to create the first photomicrographs of diatoms and biological specimens with his photographic process that employed calotypes and salted paper prints.[36] Talbot worked with low magnification, typically around 20x, and although he produced attractive looking prints, his process did not render fine detail well; therefore, much like the daguerreotype process, Talbot's prints were unsuitable as tools of scientific illustration (see Figure 2).[37]

**Figure 2 - Insect wings, as seen in a solar microscope, William Henry Fox Talbot, c.1840, salt print, National Media Museum Collection.**

Alfred Donné, a French physician and microscopy professor at the Hôpital de la Charité in Paris, France was a great advocate for the daguerreotype. Along with his assistant Jean Bernard Léon Foucault, Donné published one of the first books illustrated based on photomicrographs, *Cours de microscopie complémentaire des etudes médicales*, in 1845.[38] For the book, each of the daguerreotype plates was traced and an engraved plate was made by Foucault, which would be used to make the prints for the book. This practice would continue to be used until the 1850s when printing and photographic technology improved, and the development of the wet collodion negative process allowed for many copies of an image to be produced, eliminating the need for engravings.[39] At that point, many scientific journals, such as the *Quarterly Journal of Microscopic Science*, began to include tipped-in albumen prints or mechanically reproduced photographic images in conjunction with the articles. This allowed for an increased dissemination of photomicrographs among the scientific community.[40]

[36] Diatoms are usually single-celled algae, found in both fresh and salt water. They are a common type of phytoplankton. They are highly detailed and commonly used a subject for photomicrography; Troufléau-Sandrin, "Microscopes," 29–30.

[37] Overney, and Overney, "The History of Photomicrography;" Connor, "Photomicrography," 1120-22.

[38] Alfred Donné, *Cours de Microscopie Complémentaire des Etudes Médicales* (Paris: J.-B. Baillière, 1845); Troufléau-Sandrin, "Microscopes," 29–30.

[39] Connor, "Photomicrography," 1120-1122; Donné, *Cours de Microscopie Complémentaire des Etudes Médicales*, 1845.

[40] Connor, "Photomicrography," 1120-1122.

**Figure 3 – Male Itch Mite, Auguste-Adolphe Bertsch, ca.1855, salt print, 17.7 x 17.62 cm, SFMOMA.**

Many other photographers and scientists began to make photomicrographs in the mid-nineteenth-century. Auguste-Adolphe Bertsch, an amateur photographer, created superior renditions of a variety of subjects, and his photographs were featured in many exhibitions including many World's Fairs (see Figure 3). Bertsch spent fifteen years making photomicrographs and made significant contributions to the advancement of the technique. Even though Bertsch's photographs were technically advanced, they did not provide any additional information regarding the specimens from a scientific perspective, as his images were created to delight audiences.[41]

One of the most successful biomedical photographers to utilize photomicrographs in the 1860s was Joseph Janvier Woodward. Woodward worked in conjunction with the Army Medical Museum (AMM) in Washington, DC.[42] He used photomicrography to record and study the ailments and diseases of soldiers during the American Civil War.[43] His images were used as visual teaching aids in lectures and pamphlets.[44] As a result, Woodward and the AMM became recognized worldwide as the leading experts in medical photomicroscopy.[45]

In the 1880s photomicrography was becoming increasingly popular among both professional scientists and amateurs. Many manuals or guides were produced to assist aspiring photomicroscopists, and scientific researchers found new ways to use microscopy in a variety of fields. Advancements in optics, including the development of optical glass by Carl Zeiss and Ernst Abbe, greatly increased the clarity and sharpness of images viewed through the microscope.[46] In addition, advances in photographic technology and decreasing exposure time made it easier for photomicrographs to be produced. Practitioners such as Fernand Monpillard designed techniques that

[41] Troufléau-Sandrin, "Microscopes," 29–30.
[42] Connor, "Photomicrography," 1120-1122.
[43] Troufléau-Sandrin, "Microscopes," 29–30.
[44] Ibid.
[45] Connor, "Photomicrography," 1120-1122.
[46] John E. Shelby, *Introduction to Glass Science and Technology*, 2nd ed. (Cambridge: Royal Society of Chemistry, 2005).

used dyes or coloured screens to reveal the internal structures of specimens that were not visible to the eye.[47]

Also during this period, there were advancements in photographic techniques and photographic and microscopic apparatus. Most early cameras used for microscopy were outfitted by the practitioner themselves, many of whom patented their inventions. There were two categories for apparatus for early photomicroscopy: one where both the camera and microscope were affixed onto a solid base; the other where the camera and microscope each functioned separately.[48] By the late 1890s optics companies such as Bausch & Lomb, Zeiss, and Leitz designed and manufactured equipment for amateur photo-microscopists.[49] In some cases, cameras were specifically designed to capture images through a microscope, and in others microscopes were created to project an image onto a photographic surface. Both kinds of photo-microscopic equipment were widely used by both the scientist and the increasing population of microscope enthusiasts.

[47] Troufléau-Sandrin, "Microscopes," 29–30.
[48] Davidson, Olenych, and Claxton, "Photomicrography," 592-602.
[49] Joseph E. Barnard, *Practical Photo-Micrography* (London: E. Arnold & Co, 1925): 11-17.

## Chapter Four: Description of Dr. Max Poser's work in the George Eastman House Collection

This thesis focuses on a sample of thirty-one mid-1930s gelatin silver photomicrographs by Dr. Max Poser that are currently in the Eastman House collection. Each of the photographs were originally mounted using a liquid adhesive and over-matted using a black board with a brown bevel (see Figure 4). Out of the thirty-one photographs in the collection, five of the prints are missing the black mat (see the top-left of Figure 5). These individually mounted and matted photographs were originally mounted in groups onto larger, overall display boards, two to five prints per board (see Figure 5, 6, 7 & 9). Some of the prints in the collection have become detached from these larger display boards (see Figure 4), and some of the display boards are not present in the collection.

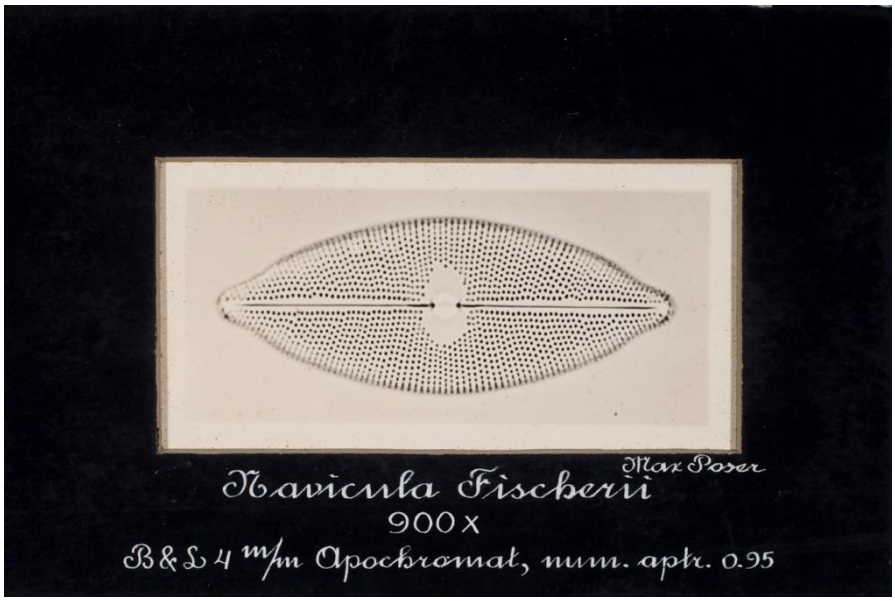


**Figure 4 – Navicula Fischerii, Dr. Max Poser, c.1935, silver gelatin print, Image: 7 x 13.6cm, George Eastman House Collection.**


**Figure 5 - Mount 325, Dr. Max Poser, c.1935, silver gelatin print pasted on board, 41 x 50 cm, George Eastman House Collection.**

Currently, the Eastman House collection holds six display boards out of a possible eight to ten used in the original presentation of the photographs. Each of the display boards in the collection is an off-white colour, and five out of the six have been labelled with a number (see lower left corner of Figure 5). The numbers on the display boards in the collection are 324, 325, 329, 330 and 331; these numbers correspond to the catalogue for the *First International Exhibition of Scientific and Applied Photography*, which will be discussed in

detail later in the thesis.[50] The adhesive residue on the display boards allowed for the mounted and matted prints that have become un-adhered to be matched with their original display boards. I have paired eight of the prints in the Eastman House collection with their display board. The other mounted and matted prints in the collection that could not be paired up with a display board also have adhesive residue on the verso and, in a similar fashion to those that could be paired with an existing display board, were most likely attached in some combination to the display boards not present in the collection. Based upon the listing of Dr. Poser's works in the catalogue for *The First International Exhibition of Scientific and Applied Photography*, these missing display boards would have been numbered with numbers that fall in-between 323 and 331.[51]

The subject of each of the photographs is one of the following: part of the human eye; bacteria; a single celled organism; or a diatom, a microscopic organism that was used to test optical equipment because of its complexity and detail. Each photograph has been hand-labelled in white ink on the black mat with the name of the subject. Each mat also lists the magnification and in some cases the type of equipment used (see Figure 4).

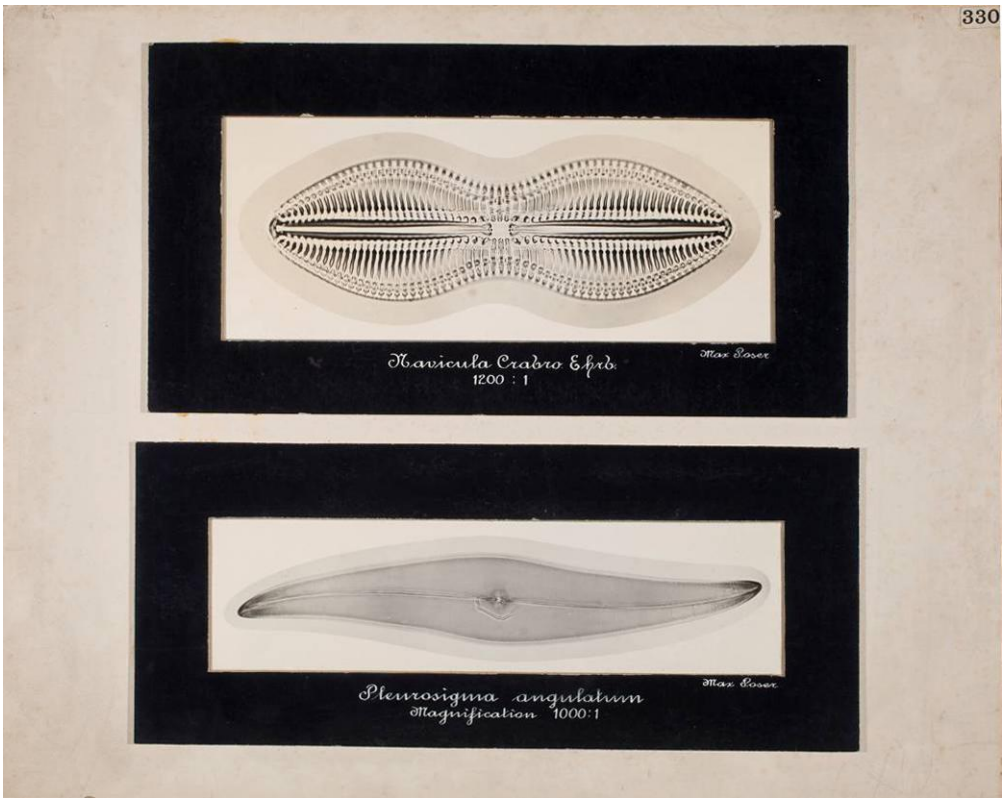


**Figure 6 - Mount 330, Navicula Crabro Ehrb. & Pleurosigma angulatum. Dr. Max Poser, c.1935, silver gelatin prints, Image: 11.2 x 27.7 cm & 7.7 x 29 cm, George Eastman House Collection.**

[50] *First International Exhibit: Scientific Applied Photography.* (Rochester Technical Section of the Photographic Society of America, 1937): 18.

[51] Ibid.

As noted above, out of the thirty-one prints, five are missing the black mat; thus, I was unable to identify the subject depicted in those prints. Of the twenty-six photographs with mats and titles, the magnifications listed range from 9000:1 to 6:1. Some subjects were recorded at multiple magnifications. For example, the diatom Pleurosigma angulatum was imaged at 9000:1 magnification and at 1000:1 magnification. The 9000:1 image is printed at 24 x 24 centimetres, while the 1000:1 magnification image is printed smaller at 7.7 x 29 centimetres. The 1000:1 magnification images depict the whole diatom, which is an elongated elliptical shape. This image is mounted with a similar diatom, Navicula Crabro Ehrenberg, allowing a comparison between specimens (see Figure 6). There are other duplications of subject matter in the series of thirty-one prints, including six prints depicting parts of the human eye, and four prints of diatoms or other unidentified cells that image different sections of the same specimen.

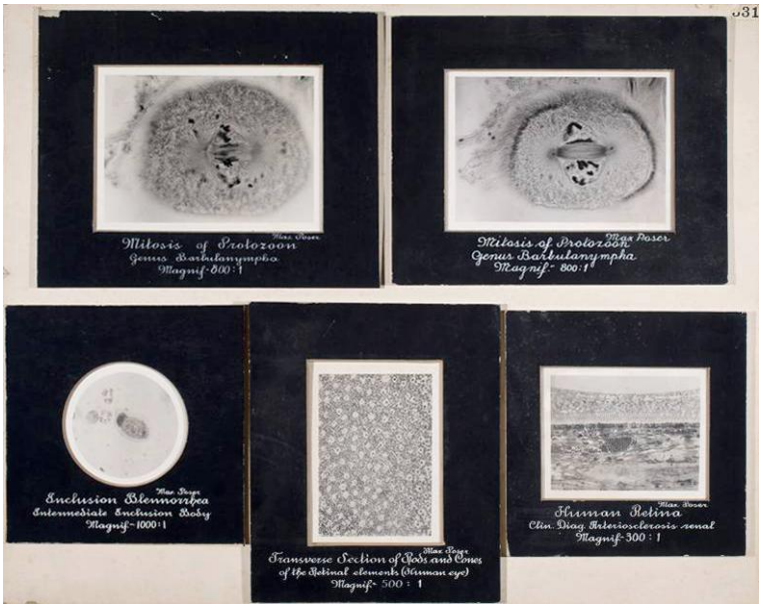


**Figure 7 - Mount 331, Dr. Max Poser, c.1935, silver gelatin prints, George Eastman House Collection.**

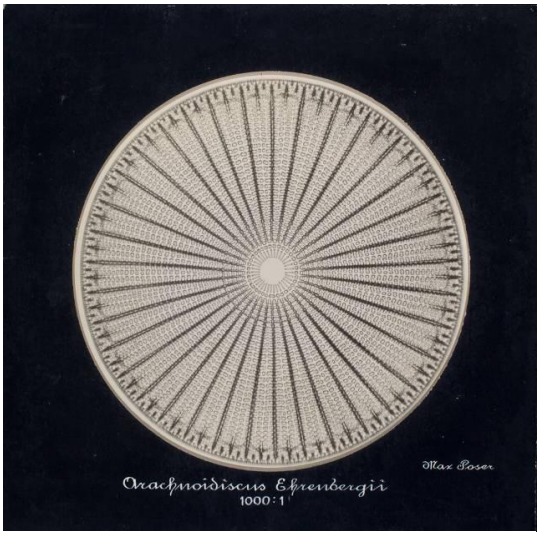


**Figure 8 - Arachnoidiscus Ehrenbergii, Dr. Max Poser, c.1935, silver gelatin print, Image: 22 cm (diameter), Mount: 29.5 x 29.8 cm, George Eastman House Collection.**

Dr. Poser studied ophthalmology, inventing several devices for examining the human eye while at Bausch & Lomb.[52] Some of the prints of the human eye appear on the same display board as some of the diatoms. For example, on mount 331 images of the mitosis of protozoa (a typical test subject for the microscope) and sections of the human eye are displayed together (see Figure 7). The mixing of subject types (diatoms, bacteria and parts of the human eye) on this display board is in contrast to the rest of the display boards in the collection that only have one subject type per board.

Traditionally photomicrographs were presented in

[52] Ophthalmology is a branch of medicine that studies the anatomy and function of the human eye.

a round format because of the vignetting produced by the microscope. In Dr. Poser's case, twenty-five out of the thirty-one prints are presented in a rectangular format, removing the circular pattern that easily identifies the photographs as being made with the aid of a microscope (see Figures 4 and 6). This distinction between the presentation of Dr. Poser's photographs and other photographs from the 1930s will be discussed later. The subjects of the seven prints that are presented in circular mats are either bacteria (see Figure 9) or other diseases, while the various diatoms and parts of the human eye are presented in rectangular mats, with the exception of the diatom Arachnoidiscus Ehrenbergii (see Figure 8), whose circular mats emphasizes the graphic nature of the diatom. Six of the vignetted prints can be linked to the existing display board that is not numbered (see Figure 9) and the remaining circular print is found on the display board with the multiple subject types (see Figure 7). The display board with the six vignetted prints does not have exhibition labels on the back (which will be discussed in the next paragraph).

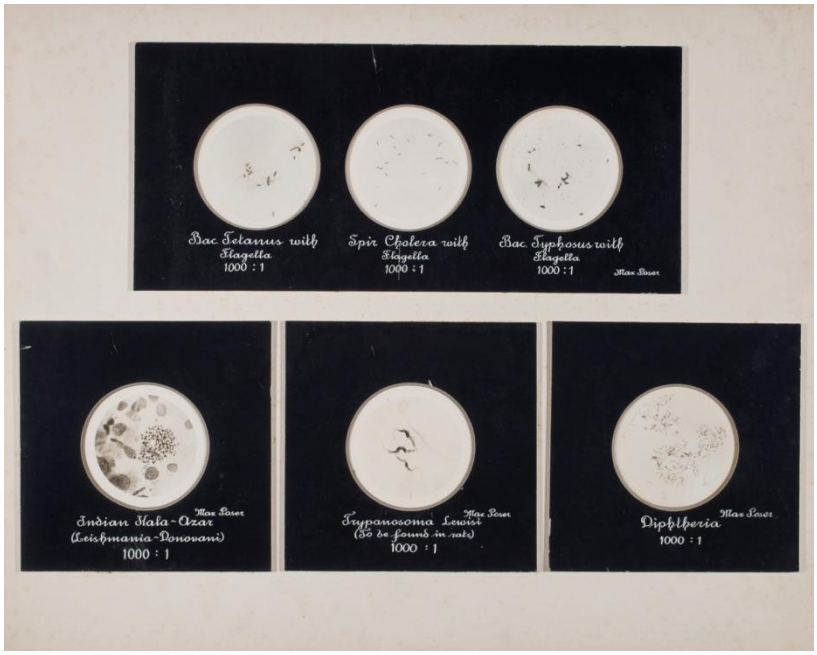


**Figure 9 - Untitled Mount, Dr. Max Poser, c. 1935, silver gelatin prints, Overall: 40.8 x 51cm, George Eastman House Collection.**

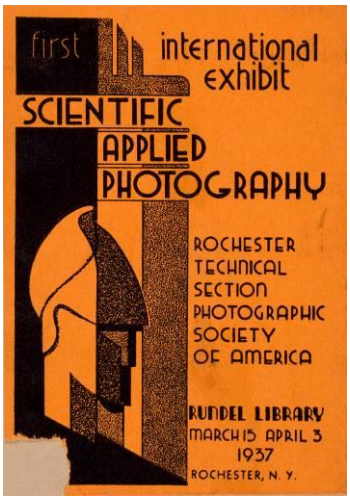


**Figure 10 - Label for the First International Exhibition of Scientific and Applied Photography, 8.5 x 6cm, 1937.**

Each of the display boards that are numbered have two labels affixed to the back. The first label is bright orange and measures 8.5 x 6 cm in size (see Figure 10). It denotes that this display board and the matted prints once adhered to it were exhibited at the *First International Scientific Applied Photography* exhibition at the Rundel Library in Rochester, New York from 15 March to 3 April 1937. The label also indicates that the exhibition was part of the Rochester Technical section of the Photographic Society of America (PSA).[53] The second is a light

[53] The Photographic Society of America is a non-profit photography club formed in 1934. It will be discussed in detail later in the thesis.

blue label measuring 8.5 x 11.75 cm in dimension (see Figure 11). This label indicates that this display board and the matted prints once adhered to it were also exhibited at the Art Center School in Los Angeles, California for one week from 2 January to 10 January 1938.


**Figure 11 - Label for the Los Angeles location of the First International Exhibition of Scientific and Applied Photography, 8.5 x 11.75cm, 1938.**

This collection of Dr. Poser's images arrived at the Eastman House along with many other photographs that were in the *First International Exhibition of Scientific and Applied Photography.* Although the records of the arrival of the collection have not been located, from the information provide in the accession records I assume that Dr. Walter Clark donated the collection at an undetermined date. Dr. Clark was an active member of the PSA and acted as a judge for the society's exhibitions in the technical section during the 1930s.[54] He was also on the exhibition committee for the *First International Exhibition of Scientific and Applied Photography.*[55] Dr. Clark donated many photographs to Eastman House, and he was instrumental in acquiring the Gabriel Cromer collection for the Kodak study collection in the 1930s, which was one of the three largest collections within Eastman House when the museum was founded in 1949.[56] Dr. Poser's photographs, along with the other photographs from the *First International Exhibition of Scientific and Applied Photography* are an important example of a 1930s exhibition of scientific photography in the Eastman House collection.

[54] C.B. Neblette, "Scientific Section Plans International Exhibition of Applied and Scientific Photography," *Journal of the Photographic Society of America* 2, no. 2 (1936): 11.
[55] *First International Exhibit,* 2.
[56] Mary E. McCrank, "'Godfather' of Eastman House collection dies," *Democrat and Chronicle*, December 16, 1991.

**Chapter Five: The Biography of Dr. Max Poser and his Work at Bausch & Lomb**

Bausch & Lomb, one of the largest North American optical companies, has become widely recognized as being a frontrunner in eye care and optical equipment. Based in Rochester, New York, the company began manufacturing specialized eye care and medical equipment in the mid-1860s. The company is also known for its pioneering employee benefit programs and public service.

The company was founded by John Bausch and Henry Lomb. John Jacob Bausch (1830-1926) was a German optician who immigrated to the United States in 1849 due to the March Revolution in Germany at the time. He strove to start an optical company in Rochester that imported eye glasses from Germany, since there were currently no American manufactures of eye glasses at the time. After a couple of unsuccessful attempts at starting the business, Bausch met Henry Lomb (1828-1908), another German immigrant, while he was working as a wood turner, and together they formed the Bausch & Lomb Optical Co. in 1853.[57] In 1860, Lomb lent Bausch sixty dollars to support his business, with the potential to become a partner in the future.

At the beginning of the American Civil War in 1861, Lomb volunteered for military service where he ascended through the ranks to become captain. Throughout the war, Lomb sent his wages to Bausch to fund the struggling business. During the war Bausch was busy inventing new products including a method for using vulcanized rubber, also known as Vulcanite, as a material for spectacle frames.[58] This use of Vulcanite greatly decreased the cost of spectacles, making them more affordable. These flexible frames were very successful, and by the end of the war in 1865, the business had over thirty employees. Lomb, after returning from the field, became a full partner, and along with Bausch they continued to advance the company.

In 1866, Bausch & Lomb decided to purchase the exclusive rights to use Vulcanite for spectacles, renaming the company the Vulcanite Optical Company, one of the many name changes the company would have throughout its long history. Lomb left Rochester to open a sales office in New York City, while Bausch stayed in Rochester and opened the first Bausch & Lomb factory. Bausch sold his retail business to focus on manufacturing and development of eye glasses and other optical instruments. The company continued to grow, introducing many new methods and

[57] Simon H. Gage, "Microscopy in America (1830-1945)," in *Transactions of the American Microscopical Society* 83, no. 4 (1964): 27.

[58] Vulcanite was also referred to as ebonite.

developments in the process of glass grinding and streamlined manufacturing of glass and equipment.[59]

In 1874, a new larger factory was built, and John Jacob Bausch's son, Edward, began to design and develop microscopes for the company.[60] Very few microscopes were made in the United States at this time, and Bausch & Lomb became frontrunners in microscope manufacturing and distribution. In 1876, Bausch & Lomb officially announced the addition of a department for microscopes, telescopes and achromatic lenses. This department was run by Ernst Gundlach, an established microscopist, with Edward Bausch as head of research and development. Edward Bausch displayed his American made microscopes at the Philadelphia Centennial Exhibition in 1876, leading to an increased interest from the public and to the first microscope catalogue by Bausch & Lomb being issued that same year.[61]

Over the next twenty-five years Bausch & Lomb would continue to develop a number of new products including microscopes, cameras, telescopes and projectors. In the 1882 microscope catalogue, new microscopes with electric light were described as being superior for the creation of photomicrographs in comparison to earlier models.[62] The company also became the manufacturer of lenses for Carl Zeiss, an established German optical company and a leader in the manufacturing of microscopes. The Eastman Kodak company also employed Bausch & Lomb to design and manufacturer lenses for their line of cameras.[63]

Bausch & Lomb developed their own line of cameras as well, including those specially designed for photomicrography. In 1884, Bausch & Lomb began to sell cameras for photomicrography, but the cameras did not include an attached microscope. Bausch & Lomb designed their first camera to be used in conjunction with a microscope in 1887 for Dr. George M. Sternburg, a surgeon in the United States Army.[64] In the coming years, the Bausch & Lomb catalogues featured equipment designed to photograph microscope slides, including cameras designed to attach to microscopes or microscope/camera combinations.

After the turn of the twentieth-century, Bausch & Lomb had established itself in multiple cities within the United States and Europe. William Bausch, another son of John Jacob, set out to manufacture optical glass in the United States because the company was still relying on imports from

[59] Sullivan, *A Brief History of Bausch & Lomb's First 150 Years*, 10.
[60] [Donovan A. Shilling?], *A Photographic History of Bausch & Lomb,* (Rochester, NY: Bausch & Lomb, 2011): 8.
[61] Sullivan, *A Brief History of Bausch & Lomb's First 150 Years*, 11-20.
[62] Summary of Bausch & Lomb early microscope catalogs, (ca.1920): Box 938, Bausch & Lomb archive.
[63] Sullivan, *A Brief History of Bausch & Lomb's First 150 Years*, 12.
[64] Ibid.

Europe.[65] William Bausch worked on this project for many years, and in the process he created new methods for refining and grinding glass but did not begin creating optical glass until the outbreak of the First World War. At this time, optical glass was declared an essential material by the United States government, and Bausch & Lomb made three quarters of the estimated six hundred thousand pounds of glass required.[66] In the 1910s, the company began to create and sell equipment for testing eyesight, both for the public and for the United States Army. The company became leaders in the production of equipment for ophthalmology, and it was during this time period that Dr. Max Poser came to work for Bausch & Lomb.

Max Hermann Carl Poser was born in Jena, Prussia in 1870. There he studied at the University of Jena and the Carl Zeiss Optical Institute under Dr. Ernst Abbe, who co-founded Carl Zeiss AG. Dr. Poser received his doctorate in Physiological Optics in March of 1889 at the University of Jena and worked for the Carl Zeiss AG company until 1899 when he became the Managing Director of their London plant. In 1913 Poser began to work for Bausch & Lomb at the London branch, and on 1 April 1914 he moved to Rochester, New York to work at the main office.[67]

**Figure 12 - Dr. Max Poser, unidentified photographer, n.d., silver gelatin print, 20 x 25.4cm, Bausch & Lomb Archive.**

Little information is available regarding Dr. Poser's career before his work with Bausch & Lomb.[68] As a special representative of Bausch & Lomb, Dr. Poser specialized in presenting newly developed scientific instruments and technical improvements created by the Bausch & Lomb company. He lectured at many universities and colleges as well as scientific societies, and gave lectures tailored for the general public on optics. He also attended conventions and exhibitions that involved other optic companies to make observations and notes for Bausch & Lomb.

Dr. Poser acted as a public representative for Bausch & Lomb, but he was also a consultant to many of the researchers and innovators who used Bausch & Lomb equipment. He was considered

[65] Optical glass has a refractive index in the mid-point of the visible light spectrum, making it a suitable material for the creation of eye-glasses and lens; Schott Glass, "Optical Glass: Description of Properties," Stanford University, http://www.stanford.edu/class/ee347/sglass.pdf (accessed August 4, 2012).

[66] Sullivan, *A Brief History of Bausch & Lomb's First 150 Years*, 20-28.

[67] "Dr. Max H. Poser: Microscopy Expert," 5 January 1946, Box 602, Bausch & Lomb archive.

[68] Any mention of his affiliation with the Carl Zeiss Company was removed from his public obituary by a Bausch & Lomb employee as seen the drafts of his obituary at the Bausch & Lomb archive, Box 602.

one of the world's most proficient and educated microscopists. His expertise with Bausch & Lomb's equipment aided in significant developments towards treatments for malaria, sleeping sickness and managing post-surgical infection. He also invented devices for the examination of human eyes and measuring eye sight, including the well-known Poser Slit Lamp, the Ives Acuity Apparatus and the Stereo Campimeter.[69] The later part of Dr. Poser's career was spent on photomicrography and other special projects, such as the Bausch & Lomb exhibit at the *Century of Progress Exposition* in Chicago, which will be discussed in a later chapter.

In 1937 Dr. Poser received an honorary life membership to the American Academy of Ophthalmology and Otolaryngology, the highest honour awarded in ophthalmology at that time. He was also a member of many societies both in the United States and Britain including the Royal Photographic Society and the American Association for the Advancement of Science, and he held a Fellowship at the Royal Microscopical Society. He was on the scientific advisory board for Beta Sigma Kappa, an international optometric honour society. As a significant individual within the Bausch & Lomb company during a period of development and advancement in microscopy, Dr. Poser contributed to the fields of ophthalmology and photography.

[69] "Dr. Max H. Poser: Microscopy Expert," Box 602.

## Chapter Six: Exhibitions of Scientific Photography and Photomicrographs in the 1930s

The photographs by Dr. Max Poser that were featured in the *First International Exhibition of Scientific and Applied Photography* are now stored at Eastman House; they represent a small sample of photomicrographs that the public encountered in the 1930s. Since the beginning of photography images of scientific subject matter had been displayed to the public and the presentational methods, purpose and locations of these exhibitions varied. By examining exhibitions from the 1930s that feature photomicrographs, a framework is created to contextualize the exhibitions that included the work of Dr. Poser.

Photomicrographs captivated audiences because of their ability to reveal aspects of everyday objects that were not visible to the unaided eye. Photomicrographs exposed the invisible and as a result the public valued these images both for their contribution to science and for their capability to amaze. In the nineteenth-century these images were presented in small exhibitions, but one of the major methods of disseminating these images was through illustrated lectures.[70] These lectures were formatted for the general public and combined the dissemination of scientific knowledge with the opportunity to experience something previously unseen. The organizers of these lectures and exhibitions selected photomicrographs based upon the audience's familiarity with the subject matter; the more familiar a viewer was with the subject, the more wondrous the photomicrograph would be. The formal composition of the image also contributed to a photomicrograph being chosen; a visually interesting image was more likely to be selected than an image lacking formal aesthetics.[71] The general public could also purchase photomicrographs/scientific images in the form of stereoviews, which were commercially produced in collectable series by major stereoview manufacturers such as the Keystone View Company (see Figure 12). The dissemination of photomicrographs in the nineteenth-century was


**Figure 13 - The Scales on a Butterfly's Wings, Keystone View Company, c. 1940, silver gelatin prints, George Eastman House Collection.**

[70] Troufléau-Sandrin, "Microscopes," 29–30.
[71] Troufléau-Sandrin, "Microscopes," 29–30.

designed around the interest of the audience and structured to bring the public to the presentations, whether it was through lecture or exhibition.

Photomicrographs were a party of a number of exhibitions leading up to the presentations of which Dr. Poser's photographs were a part. In 1929, the Royal Photographic Society (RPS) began a series of exhibitions that highlighted scientific and applied photography titled, *Photography in the Service of Mankind*.[72] The purpose of this series of exhibitions was to emphasize the many ways that photography assisted the growth of knowledge.[73] Topics in this series included: astronomical photography, colour photography, kinematography, photography in agriculture, photography in travel, and x-ray photography.[74] *Camera and Microscope*, the seventh exhibition in this series, focused on the photomicrograph and was mounted in January 1937. The month following the exhibition, the RPS published Chairman F. Martin-Duncan's speech that was given to the members of the society following the opening of the exhibition. This speech, and the subsequent article, focused on the particular fields in which the use of photomicrography had advanced understanding, such as biology and metallurgy. In the introduction to this article, photomicrographs were highlighted as research tools, and it was noted that they required in-depth explanations of their subjects to fully appreciate the impact and content of the images. Martin-Duncan was impressed with the photomicrographs in the exhibition because of their visual complexity and ability to reveal structures that were invisible to the naked eye, and he expresses that the causal viewer could only begin to appreciate their true value. He went on to state that "only a surrealist artist could be expected to enjoy a casual walk round an exhibition such as this and his appreciation would be of its superficial aspects only."[75] Martin-Duncan also commented on how *Camera and Microscope* was potentially the most important segment of the series thus far, placing photomicrography on a higher level of importance than other types of scientific photography.[76] Dr. Poser did not have any photographs in this exhibition, and it is not currently known why he did not submit his work; perhaps it was due to his upcoming participation in the March-April 1937 *First International Exhibition of Scientific and Applied Photography*, which will be discussed in the following chapter.

[72] The Royal Photographic Society is the oldest photographic society and was founded in London, United Kingdom in 1853. The Society recounts the concerns and questions of the members of the society, including presenting member's photographs in exhibitions.

[73] F.J. Pittock, "The Production and Use of Microscopic Sections," *The Photographic Journal* 77 (April 1937): 207.

[74] F. Martin-Duncan, "Camera and Microscope in the Service of Mankind," *The Photographic Journal* 77 (February 1937): 74-81.

[75] Ibid, 74.

[76] Martin-Duncan, "Camera and Microscope," 77-81.

In February 1937, *Photography 1839-1937*, the first major photography exhibition at a museum, opened at the Museum of Modern Art (MoMA) in New York, a museum that has since become the authority on photography as an aesthetic medium.[77] The exhibition was curated by Beaumont Newhall, who would become the first curator of MoMA's Department of Photographs and, later in 1948, the curator of photographs at Eastman House.[78] *Photography 1839-1937* was the first exhibition of its kind in a major art institution, bringing together over 800 photographs. The exhibition featured both the aesthetic and technical aspects of photography, from daguerreotype and salted paper prints representing the beginnings of the medium, to Modernist silver gelatin images. The majority of the photographs in the display were contemporary, with less focus on historical images and development of photography in other fields, while still providing an overview of the history of photography.[79] A catalogue by the same name accompanied the exhibition, containing one of the first written histories of photography to treat photography as an art form;[80] it would later form the basis for Newhall's *The History of Photography*, which would become the seminal guide to the history of photography.[81] The cover of the catalogue featured images by Eadweard Muybridge that, while categorized within the book as movement photography, would later be classified by photographic historians as early scientific motion photography.[82]

Newhall's catalogue and subsequent publications was one of the first major retrospectives and histories of photography that presented the evolution of photography chronologically while examining the technological advancements of the medium and prioritizing the aesthetic qualities of the photograph. As explored by Anne McCauley in her essay "Writing Photography's History Before Newhall," the shift in the early twentieth-century from photographic history being presented as a series of technological advancements to a history that considers the formal qualities of individual images was due to various reasons including the beginning of the acceptance of photography as an art form and the advancement of mechanical reproduction of images, which allowed for the in-depth examination of individual images in publication.[83] Many of the photographers featured in Newhall's

[77] Phillips, "The Judgement Seat of Photography," 28.

[78] Lee Sorensen, "Beaumont Newhall," Dictionary of Art Historians, http://www.dictionaryofarthistorians.org/newhallb.htm (accessed June 10, 2012).

[79] Daniel Norman, "The Museum of Modern Art: Photography, 1839-1937," *History of Science and Society* 30, no. 1 (1939): 127-128.

[80] Beaumont Newhall, *Photography 1839-1937* (New York: The Museum of Modern Art, 1937).

[81] Beaumont Newhall, *Photography: A Short Critical History*, (New York: The Museum of Modern Art, 1938); This was the second version of the book, based upon the catalogue for the exhibition *Photography 1839-1937*. It would become the basis for Newhall's four editions of the *History of Photography*.

[82] Naomi Rosenblum, *A World History of Photography* (New York: Abbeville Press, 1997).

[83] Anne McCauley, "Writing Photography's History before Newhall," *History of Photography* 21 (summer 1997): 88.

publications continue to be included in surveys of photography written by other authors, showing Newhall's influence on the history of the medium.[84] This exhibition, catalogue and the resulting four editions of Newhall's history of photography have become a significant source for photography historians and students, demonstrating the importance of this exhibition.

Newhall's exhibition sought to present a history of photography that examined the technological evolution of the medium, including the applications of photography. In the original exhibition and catalogue there was a section devoted to scientific photography, including photomicrographs. Out of the 841 photographs in the overall exhibition, eighty-one were devoted to the section on scientific photography. In addition, within the section on scientific photography, Newhall created eight sub-sections, including one devoted to photomicrography which included a list of twenty-seven photographs and one illustration. The majority of the exhibition and catalogue did not feature scientific photographs, but photomicrographs did make up a large portion of the scientific photography section.[85]

The photomicrographs represented in the exhibition were from four sources. One image, the only photomicrograph reproduced in the catalogue, was from the influential 1931 publication *Micrographie Décorative* by Laure Albin-Guillot.[86] Five images were provided by A.E. Smith, a British photographer and active exhibiting member of the RPS.[87] The rest of the photomicrographs listed in the catalogue were produced by either Bell Telephone Laboratories in New York, or the Eastman Kodak Research Laboratory in Rochester, New York, which was directed by C.E. Kenneth Mees who also served as honorary advisor to the exhibition.[88] The majority of the photomicrographs came from scientific laboratories, which would suggest that the photomicrograph was originally used as a scientific tool. Within the context of this exhibition and catalogue the photomicrographs were placed among photographs valued for their formal characteristics, which could influence the viewer to read the photomicrographs as aesthetic objects, rather than solely scientific information.

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[84] Allison P. Bertrand, *Making history: Beaumont Newhall's 1937 catalogue for the Museum of Modern Art*, (master's thesis, Arizona State University, 1995. In ProQuest Dissertations and Theses, http://ezproxy.lib.ryerson.ca/login?url=http://search.proquest.com.ezproxy.lib.ryerson.ca/docview/304158091?accountid=13631

[85] Newhall, *Photography 1839-1937*.

[86] Laure Albin-Gulliot, *Micrographie Décorative*, (Paris: Draeger Frères, 1931).

[87] Royal Photographic Society, "1907: exhibits by A. E. Smith," http://erps.dmu.ac.uk/exhibits_year2.php?enid=1907&ername=A.+E.+Smith (accessed June 14, 2012); Martin-Duncan, "Camera and Microscope," 74-81.

[88] Newhall, *Photography 1839-1937*.

Newhall addressed the section of photomicrography displayed in *Photography 1839-1937* in his 1938 version of the catalogue published as *Photography: A Short Critical History*.[89] He did not address the physical appearance of photomicrographs, their aesthetics or how they were displayed; he only mentioned the application of photography to the field of microscopy and highlighted the ability of the microscope to reveal the unseen.[90] Newhall's choice to include photomicrographs in his publications and exhibition, alongside photographs valued for their aesthetic qualities influenced how photomicrographs are valued due to the importance and mass consumption of his version of the history of photography.

Each of these exhibitions presented photomicrographs in a formal gallery setting, but the location and context of the exhibition altered the audience's perception of the work. The photographs in *Camera and Microscope* were mounted within the walls of the RPS and were selected from work by the members of the RPS, including A.E. Smith whose work was also in the exhibition at MoMA.[91] The audience for this exhibition was very different than that of the exhibition at MoMA; those entering the galleries at the RPS would mostly be members of the society or would already be enthusiastic about photography. The exhibition at MoMA was presented to a general audience who were focused on viewing the aesthetics of the images in conjunction with the chronological evolution of photographic technology. These two different exhibitions show how similar kinds of photographs were presented and consumed in different ways during the late 1930s.

[89] Newhall, *Photography: A Short Critical History,* (1938).
[90] Ibid, 85.
[91] Martin-Duncan, "Camera and Microscope," 74-81.

## Chapter Seven: The Exhibitions of Photomicrographs by Dr. Max Poser

Dr. Max Poser did not participate in or his work was not selected for the exhibitions mentioned in the previous chapter, but he did participate in a number of exhibitions leading up to and including the displays that incorporated the photomicrographs from the Eastman House collection. This section reviews a selection of exhibitions and publications that Dr. Poser was involved with and discusses how his photomicrographs were presented.


**Figure 14 - Bausch & Lomb section of the Century of Progress exhibition, 1935, 16 x 20cm, Bausch & Lomb Archive Collection.**

As a member of the Royal Photographic Society (RPS), Dr. Poser had participated in the society's 55th annual exhibition in 1910.[92] His photographs appeared in the "Scientific and Technical Photography and its application to Processes of Reproduction" section.[93] The subjects of the photographs in this exhibition were, in some cases, the same as the subjects of the photographs that would later be donated to Eastman House. The RPS exhibition presented three other sections of photography, including a Pictorial section which focused solely on artistic photography in contrast to the applied photography sections. Each of the sections was displayed separately, and each was published in different parts of the catalogue.[94] Dr. Poser's photographs were separate from the art photography section, appearing in the technical section with other practical applications of photography. Therefore, viewers of this exhibition were not expecting to be viewing art when observing his work at this venue; rather, they were expecting to see an example of advanced technical proficiency. This separation shows that as part of the RPS exhibition, Dr. Poser's photographs were valued as examples of the practical application of photography to the sciences, not as aesthetic objects.

[92] Royal Photographic Society, "1910: exhibits by Max Poser," http://erps.dmu.ac.uk/exhibits_year2.php?enid=1910&ername=Max+Poser (accessed June 14, 2012).

[93] It is interesting to note that F. Martin-Duncan, who was a big promoter of the *First International Exhibition of Scientific and Applied Photography* as part of the Photographic Society of America, was on the selection committee for this section of the exhibition that featured Dr. Poser's photographs.

[94] "First International Exhibition of Scientific and Applied Photography," 10.

Dr. Poser's photographs had also been featured as part of the Bausch & Lomb exhibit at the *Century of Progress International Exposition* in Chicago as part of the 1933 World's Fair.[95] The tagline of the exposition was: "Science Finds, Industry Applies, Man Adapts." The exhibition highlighted current technological innovations and featured major companies focused on modernizing technical equipment and services. Bausch & Lomb was a very prominent optics company at this time and wanted to create an exhibit that would make the company stand out from its competitors.[96] Dr. Poser was instrumental in creating the exhibit for Bausch & Lomb, including the selection of items to be presented and the organization of the exhibit.[97] The photographs by Dr. Poser in this exhibition were used to display the magnification power of Bausch & Lomb microscopes, thus promoting Bausch & Lomb equipment and acting as examples of improved microscope technology.

These same images were reproduced in a 1934 publication produced by Bausch & Lomb called *The Educational Focus*.[98] The images Dr. Poser selected to illustrate his article, "Test Objects for the Microscope," instructed the user of Bausch & Lomb microscopes on suitable subjects for calibrating his or her microscopes. Dr. Poser explained in the article that the subjects he selected were not only finely detailed and symmetrical for ease of calibration, but also were of a high aesthetic value.[99] In the text of the article Dr. Poser described his photomicrographs as "very beautiful in form and design," showing that he valued his photomicrographs both as a scientific object and as an aesthetic object.[100] Some of the images reproduced in *The Educational Focus* were the same images or were of the same subjects now found in the Eastman House collection; therefore, the same images featured in the exhibitions at the Rundel Library and the Art Center School were first used as a way to advertise and promote the products of Bausch & Lomb. The use of Dr. Poser's images in this manner shows how the same image can be used in different ways, adding to the biography of the image and the history of its use.

In 1937, the Technical Section of the Photographic Society of America (PSA) created a travelling exhibition that would highlight the scientific and applied uses of photography.[101] As we

[95] M.C. Williamson to Dr. Poser, May 12, 1933, Box 645. Bausch & Lomb Archive.
[96] Various Correspondence, 1933, Box 645, Bausch & Lomb Archive.
[97] Ibid.
[98] Max Poser, "Test Objects for the Microscope," *The Educational Focus* V, no. 1 (1934): 6-10; M.C. Williamson to Dr. Poser, May 24, 1933, Box 645, Bausch & Lomb Archive.
[99] Poser, "Test Objects for the Microscope," 6.
[100] Poser, "Test Objects for the Microscope," 7.
[101] Photographic Society of America, "About PSA: PSA History," http://www.psa-photo.org/about-psa/psa-history/ (accessed June 14, 2012); The PSA is an international non-profit organization formed in 1934 out of The Associated Camera Clubs of America. The society continues to host a number of different divisions all over the United States and abroad. Exhibitions are a key activity of the society, including a large exhibition each year, and smaller themed exhibitions created by different sections of the society.

know from a history of the Technical Division of the society published in the September 1946 edition of the *Journal of Photographic Society of America*, the Technical Division of the PSA had found that the annual exhibition of photography put on by the society was primarily focused on pictorial values, and the additional travelling exhibition created by the Technical Division featured works that were intended to bring forth new knowledge regarding the uses of photography.[102]

The thirty-one photographs by Dr. Poser, along with other scientific photographs now in the Eastman House collection, were part of the 1937 travelling exhibition. Its title was *First International Exhibition of Scientific and Applied Photography*, and it was sponsored by the Rochester Technical Division of the PSA. It featured over 800 photographs divided into ten different categories, including both technical advancements in photography and the use of photography in science.[103] These categories included: (1) colour photography; (2) astronomy, meteorology and aerial photography; (3) photomicrography; (4) medical photography; (5) documentary photography; (6) high speed photography; (7) stereoscopic photography; (8) photography in physics and chemistry; (9) natural history photography; and (10) a miscellaneous section that included press photography. The first appearance of the exhibition, from 15 March to 3 April 1937, took place at the Rundel Library in downtown Rochester, New York; this location was selected because it provided ample space for both photographs and apparatus.[104] The most of the categories of the exhibition were mounted in the Library's art gallery, with the exception of the medical and photomicrography categories that were mounted in the Main Gallery and featured the largest number of images.[105] Information about the planning and development of the exhibition by the Technical Section was featured in the editions of the *Journal of the Photographic Society of America* that led to the exhibition.[106] The March 1937

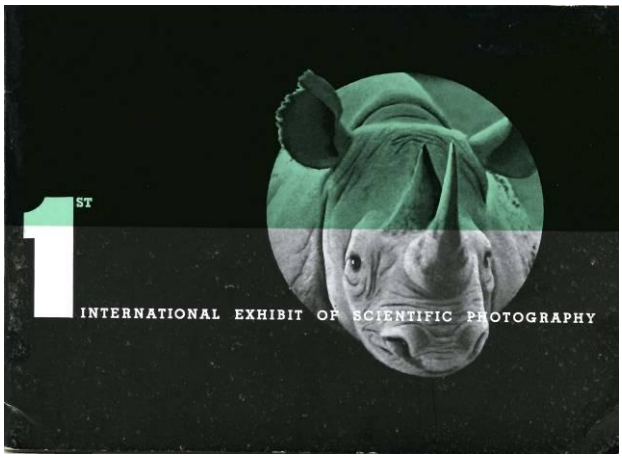


**Figure 15- Catalogue for the First International Exhibition of Scientific Photography at the Art Center School in Los Angeles, 1938, Art Center School Archive.**

[102] Frank E. Carlson, "Know Your Society: The Technical Division," *Journal of the Photographic Society of America* (1946): 405-406.
[103] "First International Exhibition of Scientific and Applied Photography," *Journal of the Photographic Society of America* (1937): 1-11.
[104] C.B. Neblette, "Scientific Section Plans International Exhibition of Applied and Scientific Photography," *Journal of the Photographic Society of America* (1936): 11.
[105] "First International Exhibition of Scientific and Applied Photography," 2.
[106] Neblette, "Scientific Section Plans International Exhibition of Applied and Scientific Photography," 11.

issue of the *Journal of the Photographic Society of America*, which was published during the Rundel stop of the exhibition, was almost entirely devoted to the exhibition, reprinting all the text from its catalogue.[107]

The exhibition was meant to travel to eleven cities in addition to Rochester.[108] But, as noted in chapter 4, the photographs by Dr. Poser, as well as the other photographs from this exhibition currently in the Eastman House collection, have only two exhibition labels on them, one for the Rundel Library and another for the Art Center School in Los Angeles, California.[109] There are no other labels found on the back of the objects in the Eastman House collection, and I was unable to confirm Dr. Poser's participation in the other stops of the exhibition including the Annual Convention for the PSA in Chicago in October 1937. I assume that Dr. Poser's photographs, along with the rest of the collection of photographs from the *First International Exhibition of Scientific and Applied Photography* were a part of the exhibition at all locations, but I cannot confirm this.[110]

The exhibition at the Rundel Library was widely publicized and was accompanied by lectures and radio programmes. Over 30,000 people attended during its three-week installation. The text on photomicrographs published in the exhibition catalogue and concurrently in the March 1937 issue of *Journal of the Photographic Society of America* emphasized the scientific benefit of photomicrographs, highlighting the works by Dr. Poser.[111] All of the photographs selected for exhibition were hung unframed in a salon-style hanging with no additional labelling other than what was supplied by the photographer; for Dr. Poser's work, this was the information given on the black mat, as noted in a previous chapter. The PSA requested that all participants mount their work on standard size mounts of either 16x20 or 12x16 inches, creating a uniform look to the installation.[112] The size and quantity of the images on each mount varied from piece to piece and the information provided with the images varied greatly from mount to mount.

From 2 to 10 January 1938, the exhibition at the Art Center School in Los Angeles featured 600 of the 800 photographs presented at the Rundel Library. It is important to note the focus of the

[107] "First International Exhibition of Scientific and Applied Photography," 1-11.

[108] Other cities on the suggested itinerary include: New York, Philadelphia, Washington, Pittsburgh, Cleveland, Detroit, Chicago, Seattle and Minneapolis. Some of the submissions to the exhibition included transparencies, which were only exhibited at the Rundel Library location.

[109] Ibid. The suggested itinerary, as outlined in the March 1937 *Journal of the Photographic Society of America*, states that the exhibit would be shown in Los Angeles during the first week of January 1938; this corresponds to the dates that appear on the exhibition label from the Art Center School.

[110] *First International Exhibit: Scientific Applied Photography* (Rochester Technical Section of the Photographic Society of America, 1937): 1-37

[111] Ibid, 1-11.

[112] Submission Form for the First International Exhibition of Scientific and Applied Photography, Photomicrography Box B, George Eastman House Photography Collection. Participants from all over the world were encouraged to apply, not just members of the Photographic Society of America.

Art Center School, as it was a different kind of institution in comparison to the Rundel Library. The Art Center School was created to train individuals in the practical applications of art. In the late 1930s, Ansel Adams, a noted modernist photographer, acted as a guest lecturer for the photography department.[113] Thus, this venue's focus on the artistic merits of photography and their display of *First International Exhibit of Scientific and Applied Photography* shifted the meaning of the exhibition away from examples of applied photography and gave the exhibition, and in turn Dr. Poser's photographs, new meaning as artistic works.

It is interesting to compare the two catalogues produced for the exhibition and the March 1937 article in the *Journal of the Photographic Society of America*. The catalogue produced for the week-long showing of *First International Exhibition of Scientific Photography* at the Art Center School included many images from the exhibit, while the catalogue for the Rundel exhibition functioned as a listing of the works and had no images.[114] In the Los Angeles catalogue, the text regarding photomicrographs did not highlight any particular images in the exhibition but focused on how this type of photography as an art form advanced human knowledge. The text of the Rundel catalogue did not identify photomicrographs as being art; instead it focused on them as a tool that could reveal the beauty of the world.[115] The images that were reproduced in the Art Center School catalogue were some of the same that were published in the March 1937 issue of the *Journal of the Photographic Society of America* that featured the text from the Rundel library catalogue.[116] This comparison shows that the perception of Dr. Poser's photomicrographs was dependant on their physical location. [117]

The interpretation of Dr. Poser's photographs as part of this travelling exhibition varied according to the venue in which they were displayed. As part of the Rundel Library exhibition, his work was presented as part of an overview of the technical advancements and uses of photography.

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[113] Art Center College of Design, "Art Center's History," http://www.artcenter.edu/accd/about/history.jsp (accessed May 16, 2012).

[114] *1st International Exhibition of Scientific and Applied Photography*, Los Angeles: Art Center School, 1938.

[115] *First International Exhibit: Scientific Applied Photography*, 12-13.

[116] *1st International Exhibition of Scientific and Applied Photography* 10-12; *First international exhibit: Scientific applied photography*): 7.

[117] The *Second International Exhibition of Scientific and Applied Photography* took place in 1946; Dr. Poser did not have any photographs in this edition of the exhibition, due to his death earlier in the year. This exhibition did not receive as wide coverage in the *Journal of the Photographic Society of America* as the first, even though the journal had since expanded its page count. The exhibition did not take place at the Rundel Library, but at the Memorial Art Gallery in Rochester. I do not know if this exhibition travelled to other destinations. The presentation of the work in this installation mimicked the methods used to display artworks at the time; the work was hung in a linear fashion, each print having its own separate mat. This could have been the influence of the venue or the progress of photography becoming an accepted art form. ; "Second International Exhibition of Scientific and Applied Photography," *Rochester Democrat and Chronicle*, 1946.

While the work was presented on the wall in a similar fashion to that of art, none of the additional information regarding the exhibition highlighted the work as art. This differs from the exhibition in Los Angeles, which took place at an art school and presented all of the photographs as art. These different interpretations emphasize how the meaning of the images can be altered due to their presentation, an idea emphasized by Christopher Phillips in his essay "The Judgement Seat of Photography."[118]

By comparing the use and purpose of the each of the exhibitions that featured photographs by Dr. Poser, different interpretations of his photomicrographs begin to appear. The presentation of the work in the *Century of Progress International Exposition* as part of a Bausch & Lomb exhibit functioned as advertising for the company. The subsequent publication of the work by Bausch & Lomb in *The Educational Focus* presented the images and subjects as tools for the calibration of microscopes.[119] In the context of the Rundel Library installation of the *First International Exhibition of Scientific and Applied Photography* his images were clearly defined as examples of scientific photography that advanced knowledge. The exhibition at the Art Center School changed this interpretation because the venue was art based and the literature provided with the images indicated that the works were art. Even though the same images were used in each, his photomicrographs were interpreted in different manners depending on the venue they appeared in and the text that accompanied them.

Not all of Dr. Poser's photographs from the Eastman House collection appeared in the *First International Exhibition of Scientific and Applied Photography.* The photographs that were not in the exhibition were the prints presented in circular mats on the un-numbered overall display board (Figure 9); thus, the majority of the exhibited photomicrographs were displayed in the rectangular mats. The rectangular format allowed the image to appear abstract and separate from the microscope. The subject could be visually transformed by the viewer from a scientific subject to an abstract aesthetic object due to the separation from the context of the microscope. When the photograph was first presented to the viewer, the modern rectangular presentation separated the scientific subject from the image, causing the viewer to consider the formal aspects of the image. The text and magnification told the viewer that the print is from the perspective of the microscope, but perhaps the presentation of the rectangular matted images caused these prints to be selected for exhibition, while photographs presented in the more traditional scientific format of a circle were not.

[118] Phillips, "The Judgement Seat of Photography," 48-49.
[119] Poser, "Test Objects for the Microscope," 6.

Dr. Poser's photomicrographs were featured in a number of exhibitions and publications including a travelling exhibition that was displayed at different types of institutions. Dr. Poser valued his photomicrographs as both scientific and aesthetic objects as evidenced by the text of "Test Objects for the Microscope," which would have lead him to submit his work to exhibitions.[120] Each of the institutions that displayed his work had a different mission, which changed the audience's expectations of what they were viewing. The different treatment of his work in each of these locations - as applied or scientific photography or as art photography - shows how photographs can belong to different discourses.

[120] Poser, "Test Objects for the Microscope," 6.

## Chapter Eight: Comparison of Dr. Max Poser's Photographs in Different Locations

Dr. Max Poser's photographs are found in two different Rochester collections: the Department of Photographs at Eastman House and the archive at Bausch & Lomb. The mandate at each institution is different, influencing the expectations of their specific audiences. Eastman House presents photographs as a part of the history of photography while Bausch & Lomb presents them as part of the history of its company.[121] By comparing the purposes and treatment of the collections held at the two institutions, the current context of Dr. Poser's photographs can be established.

The thirty-one prints by Dr. Poser in the Eastman House collection are stored in a vault designed with a high quality air exchange system, and temperature and humidity controls. These systems aim to preserve the photographs within the vault, deterring fading, discolouration and other forms of damage in accordance with the mission of the institution.[122] The prints are stored in archival quality boxes, and are numbered. Information about them is recorded in the museum's collection management system, The Museum System (TMS). This allows the items to be accessed by researchers and staff, and the information provided in the records aims to supply insight to each object's history and past usage. The vault is secured and staff access is limited, ensuring that the collection is protected.

Even though Dr. Poser's prints are stored in a high quality facility, they have not received as much attention from the staff of Eastman House as other photographs in the collection. Dr. Poser's photographs arrived at the museum with other photographs that were featured in the *First International Exhibition of Scientific and Applied Photography*, and stored in the same boxes. The majority of the scientific photographs from the exhibition have not been labelled with accession numbers or catalogued in TMS. Dr. Poser's photographs are the exception; in 2000, they were removed from the boxes that contain prints from the exhibition and transferred to their own box. Dr. Poser's prints were also given accession numbers and an intern, Marcos Vera, prepared a short description of the photographs[123]. Yet, this information was not transferred to TMS and the photographs were not catalogued or digitally imaged.

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[121] George Eastman House, International Museum of Photography and Film, "Mission Statement," http://www.eastmanhouse.org/museum/mission.php (accessed June 3, 2012); Bausch & Lomb, "About Bausch & Lomb," http://www.bausch.com/en/Our-Company/About-Bausch-And-Lomb (accessed June 3, 2012).

[122] Eastman House,"Mission Statement."

[123] Up until 2003 when TMS was implemented, all descriptions of collections at Eastman House were kept with the objects in their housing.

The lack of research and attention given to the photographs from the *First International Exhibition of Scientific and Applied Photography* is consistent with the management of the majority of scientific photographs at Eastman House. The choice of collection objects that will be made accessible and researched is generally up to the curators of the institution. In the case of Eastman House, scientific photography has not been a priority, and therefore is under researched. In many cases, if the archivist is unfamiliar with a body a work, he or she may not be able to suggest or show a potentially interested scholar those works. Conversely, an engaged researcher could bring attention to new, formerly less explored objects from the collection, allowing them to be catalogued and accessed. The use and focus of a collection can change as new curators and archivists join the museum, and new forms of photography are presented to the public. Dr. Poser's photographs were identified by Eastman House staff as being of interest in comparison to the rest of the exhibition, yet they did not receive the same level of care as other photographs in the collection.

In contrast, the Bausch & Lomb archive holds seven prints by Dr. Poser. This archive is currently located at the main company headquarters in Rochester, New York. The space does not have temperature controls, and it is accessible to all company staff. There are no full time employees to monitor and organize the collection; rather, a team of volunteers facilitate access to the archive. There has been an effort by the volunteers, in coordination with interns from the Rochester Institute of Technology, to organize and record the contents into a searchable database, but since there is no permanent staff member at the archive and no guidelines are available to explain how to intellectually organize the collection, the project remains incomplete.

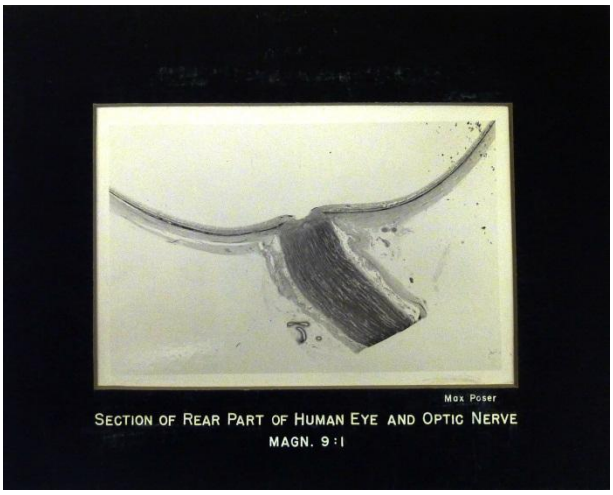



**Figure 16 - Section of Rear Part of Human Eye and Optic Nerve, Dr. Max Poser, c. 1935, silver gelatin print, Bausch & Lomb Archive Collection**

In addition, within the Bausch & Lomb archive there are no distinctions between the housings for the company's paper records and those for the photographs. Dr. Poser's prints are housed in a file box with no individual protective coverings or object specific housings. All of the boxes in the archive are labelled with a number corresponding to a rudimentary database; yet searching Dr. Poser's name did not reveal any of the box numbers that contain his work or information about him. I found the photographs by Dr. Poser purely by chance while looking

through photographs of employees. The lack of categorization of these objects demonstrates that these images were not a high priority for the archivist who began the preparation of the collection management system, and therefore not a high priority for the company.

By comparing the two collections the differences between the how photographs are used in an archive versus a museum can be addressed. The individual prints in both collections are presented in a similar way; the prints are approximately the same size, mounted onto a backing board and surrounded by a black mat with a brown bevel. Four of the prints in the Bausch & Lomb archive feature images  of the same subjects as those at Eastman House with the same inscriptions on the mat but are cropped or framed differently (see Figures 17 and 18). There are no exhibition labels or other indications of use on the prints in the archive. The remaining three photographs depict subjects not found at the museum, two of which have inscriptions completed with a stencil rather than hand-written (Figure 16).

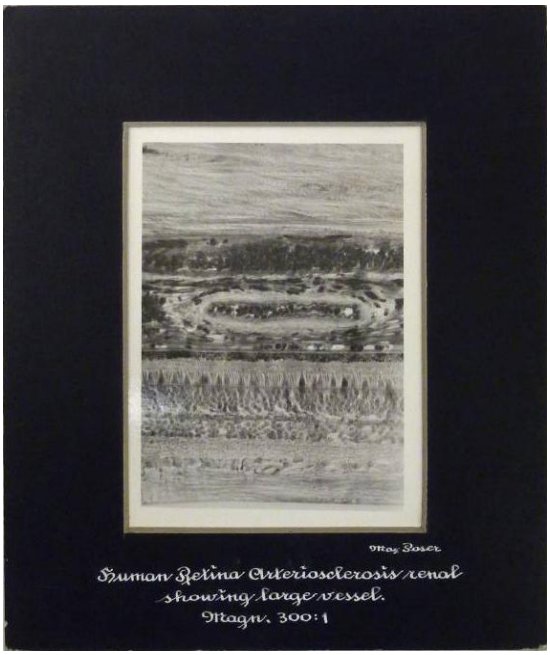



**Figure 17 - Human Retina Arteriosclerosis renal, Dr. Max Poser, c. 1935, silver gelatin print, 8.8 x 11 cm, Bausch & Lomb Archive Collection.**

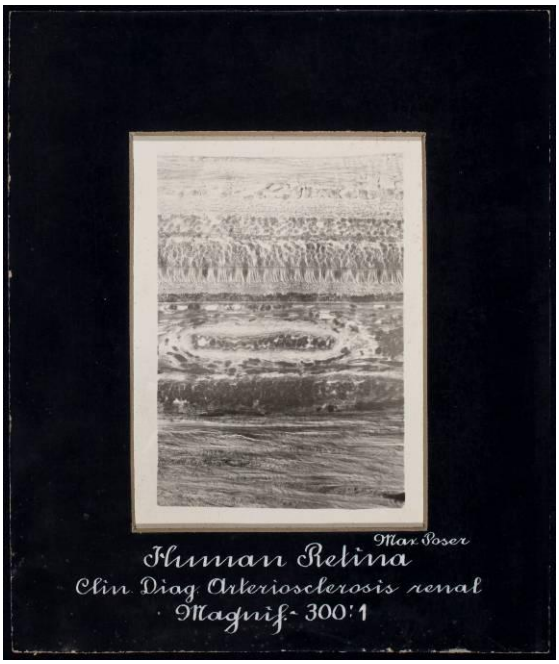



**Figure 18 - Human Retina Arteriosclerosis renal, Dr. Max Poser, c. 1935, silver gelatin print, 8.7 x 11 cm, George Eastman House Collection.**

The objects in the Bausch & Lomb archive are so similar to those found at Eastman House that I believe that they were created at the same time. The objects in the archive are most likely variants, prints Dr. Poser did not select for exhibition, which subsequently remained with his effects at Bausch & Lomb. The selection of one cropping or orientation over another of the same negative demonstrates that Dr. Poser was conscious of the formal composition of his photographs and was aiming to present the most aesthetically pleasing version of his photograph in exhibition. In

summary, the prints at the archive represent work completed at a corporation and are not treated as objects that represent a part of the history of photography. In contrast, the objects at Eastman House have been recorded and stored in the same location as other photographs that have been established as some of the most significant prints in the history of photography. As part of this collection, Dr. Poser's photographs are given a level of authority that is absent for their counterparts in the Bausch & Lomb archive.

## Chapter Nine: Conclusion

The thirty-one photomicrographs by Dr. Max Poser now housed at Eastman House can be used as a case study to examine how photographs can belong to different discourses depending on their use, the contexts that they are a part of and their physical location. These images originally functioned as records of scientific findings. They were then utilized as promotional images for Bausch & Lomb, which use switched their placement from within a scientific discourse to that of advertising. These images then appeared in exhibitions and publications that valued their aesthetic qualities as well as their merit to the sciences, moving them part of an aesthetic discourse. Dr. Poser's photographs are now held by two different institutions, with different purposes, and each of these physical locations changes the way the viewer perceives the value of the photographs through the treatment of the objects and the mission of the institution.

Meaning can be derived from both the past and present locations and uses of an object. As explored in chapter 4, these images were originally created as scientific documents based upon the work Dr. Poser completed while working at Bausch & Lomb. They then went on to be used as promotional material for the company both in the *Century of Progress* exhibit at the 1933 World's Fair and in the publication *Educational Focus*, where they acted as an illustration for the capabilities of Bausch & Lomb equipment. In this way, Dr. Poser's photographs functioned as scientific documents, publicity materials and objects of aesthetic interest in the 1930s.

Dr. Poser's appreciation of the formal aesthetics of these images led him to submit his photomicrographs to various exhibitions. As discussed in chapter 7, the photomicrographs from this case study were a part of the *First International Exhibition of Scientific and Applied Photography*, which was shown in a variety of locations including a library and an art institute. In the case of Dr. Poser's photomicrographs, they would have not ended up in the Eastman House collection had they not been a part of the *First International Exhibition of Scientific and Applied Photography*. When compared with Dr. Poser's unselected photographs from that time period, which are now housed at the Bausch & Lomb archive, another level of understanding for a researcher emerges: Dr. Poser's choice of cropping and titling shows again that he considered the aesthetic of his images to be important. Overall, the presence of his work within a library and an art museum during the exhibition as well as Dr. Poser's aesthetic decisions concerning the display of his photographs make them part of different discourses: applied scientific photography discourse and an art discourse. In addition,

this exhibition provided a degree of importance to the objects, and assisted in bestowing upon the objects a place in the histories of photography and the presentation of scientific photographs.

In chapter 8, a comparison of the current locations of each of the sets of Dr. Poser's photographs showed that the location in which photographs are kept influences the way they are handled and how the audience perceives them, a theory that was described by Krauss in her essay "Photography's Discursive Spaces."[124] Currently, the photographs in the Bausch & Lomb archive are kept as company records and not for their value as part of the history of photography. Conversely, the thirty-one photomicrographs that are the subject of this case study are a part of the collection at Eastman House, a museum whose mission it is to "collect and preserve objects that are of significance to photography."[125] The inclusion in a museum setting automatically gives the photographs a different meaning from photographs located in a non-museum setting such as an archive. In this case, the location of the collection causes the viewer to read the objects as important works to the history of photography. This comparison demonstrates how the same image can be perceived differently dependant on its physical location and the mission of the institution.

Consequently, Dr. Poser's photographs in the Bausch & Lomb archive are viewed and consumed differently from those at Eastman House. As I reflect on the professional work of Dr. Poser, it seems clear that he likely made the photographs in the Eastman House collection as part of his duties at Bausch & Lomb and did not intend them to be collected or exhibited by a museum. His employment at Bausch & Lomb includes him as part of the history of the company therefore making his photomicrographs part of the history of the company. The photographs act as a representation of the development and prominence of the company's microscopic equipment in the history of optics. Dr. Poser's photographs are now kept in a corporate archive that is not staffed, and they are not currently organized or documented in full. This is in stark contrast to Eastman House's advanced system of security and collection management, and the comparison shows how the collections and objects are valued differently. By the way it maintains its collection; each institution's value system is directly conveyed to its users. This value system in turn, influences the way the user approaches the objects in each collection, as well as the potential perceived importance of the object.

However, there is also a hierarchy within the Eastman House collection. Since Dr. Poser's photomicrographs have been at Eastman House, limited attention has been given to them. They have not been well documented, exhibited or researched, and this lack of information places them into a lower echelon of value within the hierarchy of the museum collection. In addition, Dr. Poser's

[124] Krauss, "Photography's Discursive Spaces," 311-319.
[125] George Eastman House, "Mission."

photographs were physically separated from the other objects that were originally in the exhibition with little documentation regarding the photograph's provenance; this action caused valuable information regarding the context of the exhibition to become lost. The original context of the exhibition was revealed through the archivist's knowledge of the Eastman House collection and investigation by the author, but the source of the objects would not previously have been apparent to a researcher looking at this body of work.

The separation of Dr. Poser's photomicrographs from the rest of the exhibition and the overall lack of research and documentation in respect to them can be considered reflective of the interests of Eastman House. A cursory study of other forms of scientific photography in the collection makes it apparent that Dr. Poser's photomicrographs and the photographs from the *First International Exhibition of Scientific and Applied Photography* are not the only objects of this type that have been overlooked. Generally, a large part of the items related to scientific photography at Eastman House are not catalogued and in some cases they are not entered into the database in any way. This absence of documentation reflects the interests (or rather, lack of interest) of past curators and archivists at the museum, and those of visiting researchers. The nonexistent documentation and the current staff's lack of knowledge limits what a researcher is able to access and use. Thus, the collection's caretakers can place unintended value onto objects, making another instance where objects derive value and meaning from the level of attention given to them.

To this day, scientific photography, including the subgenre of photomicrography continues to be interpreted and presented in many different contexts. In the recent 2008 exhibition, *Brought to Light: Photography and the Invisible,* the San Francisco Museum of Modern Art mounted a major exhibition that featured nineteenth-century photography from multiple disciplines, including photomicrographs, allowing them to be considered within the context of an art museum and solidifying scientific images as aesthetic objects.[126] Since the expense of scanning electron microscopes and other devices has made the field of microscopy increasingly specialized, amateurs and potential artists can no longer afford top-of-the-line microscopy equipment. Equipment manufacturers, such as Nikon, hold photomicrography contests designed for microscope technicians;[127] the images produced by microscope technicians and submitted to photomicrography contests are typically consumed in print or online formats, and the audience for such images confined to professional scientists. There is the potential for photomicrographs to be used for new functions in

[126] Keller, *Brought to Light*.

[127] Nikon, "Nikon Small World Photomicrography Competition," Nikon, http://www.nikonsmallworld.com/ (accessed May 14, 2012).

the future as technology continues to evolve and improve. Therefore, there is an increasing need to understand how photomicrographs have been used in the past and present to create a base for comprehension of future potential usages.

Historically speaking, many of the objects and photographs in the care of museums and archives have been separated from their original contexts, losing clues as to the objects' original use, purpose and context. While the move to a museum is not necessarily a negative change for an object, it does add another step in its overall journey. Each movement of an object during its lifetime increases the probability that information regarding the past locations and context will become lost. It is important for the historian researching an object and the caretaker of a collection to be aware of the history of each object, for it may not be blatant in a brief examination. By investigating the current and previous locations of each object, including the physical trajectory that the object has taken over time, alternate or additional meanings can be revealed; when tracked alongside the object, this information can be included in the recorded life of the object. This point is made by Willumson in his essay "Making Meaning," where he stresses the need for museums to examine the materiality of an object because it can reveal the object's history and therefore add to the object's significance.[128] The importance of provenance and former ownership of photographs may be clearer in the cases of famous images, but the journey of all objects can provide insight into their importance to history. Therefore, it is necessary for the caretaker of a collection to be increasingly conscious of the way photographs might be understood by a researcher or the viewer and to try and provide as much information about the original context(s) as is possible, if only through written documents. This task can be completed through well-constructed and accurate records for all photographs when they enter an institution and a well-designed database system to store and make accessible all of this information. In the end, it is up to the researcher and historian to be aware that every photograph has a physical history and that this history provides new viewpoints from which to regard the object.

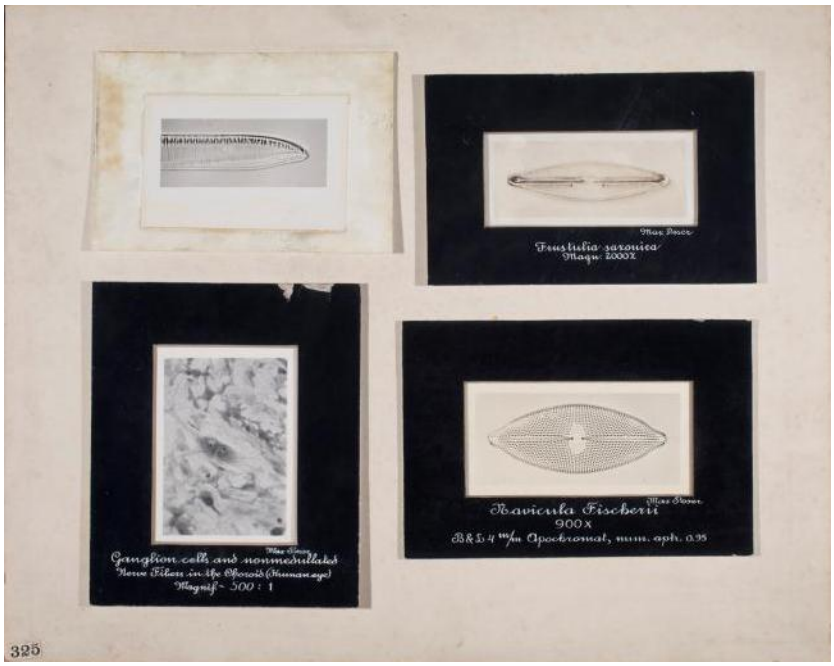
[128] Glenn Willumson, "Making Meaning: Displace materiality in the library and art museum," In *Photographs Objects Histories*, Elizabeth Edwards and Janice Hart, eds. (London, New York: Routledge, 2004): 62.

**APPENDIX**

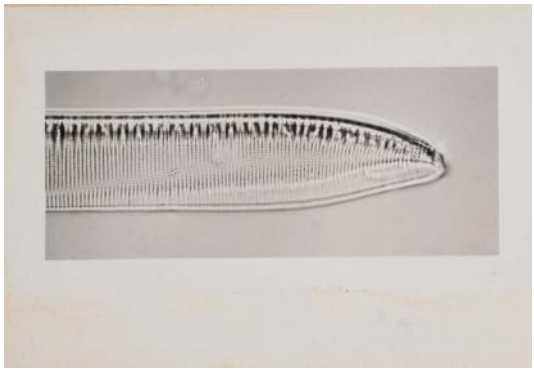
**Checklist of photographs by Dr. Max Poser (American, 1870 – 1946) in the George Eastman House Collection, gifted by Walter J. Clark.**

1. PLEUROSIGMA ANGULATUM
ca.1935
gelatin silver print
Image: 23.7 x 23.7 cm
Mount: 31.4 x 31.4 cm
Overall: 40.6 x 50.8 cm
2001:0370:0001


2. MOUNT 325
ca.1935
gelatin silver print
Overall: 40.8 x 51 cm
2001:0370:0002-0005

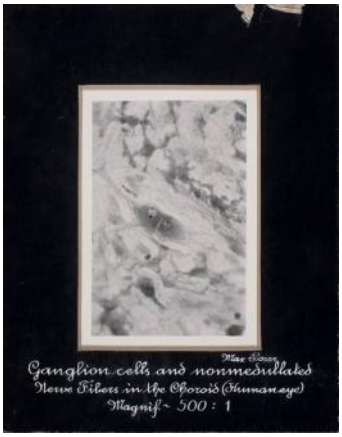


3. Descriptive Title: Diatom
ca.1935
gelatin silver print
Image: 4 x 10 cm
Mount: 12.4 x 18.2 cm
Overall: 40.6 x 50.7 cm
2001:0370:0002

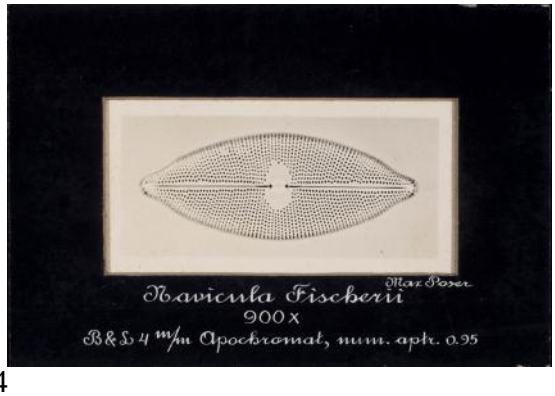


4. RUSTULIA SAXONICA
ca.1935
gelatin silver print
Image: 4.6 x 11.6 cm
Mount: 12.8 x 20 cm
2001:0370:0003

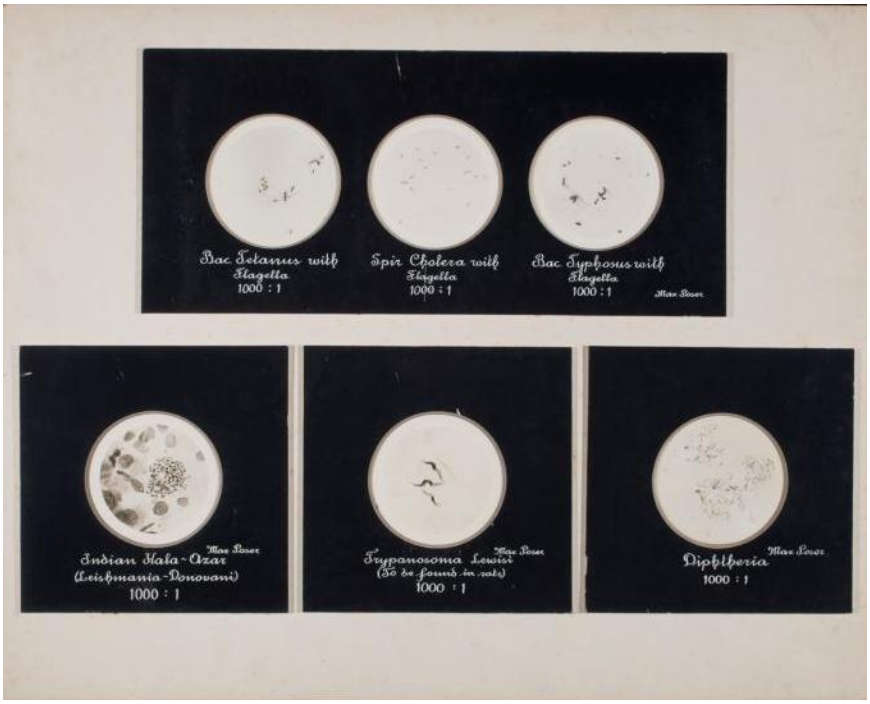

5. GANGLION CELLS AND NON MEDULLATED NERVE FIBERS IN THE CHOROID
ca.1935
gelatin silver print
Image: 10.8 x 7.9 cm
Mount: 19.6 x 16.3 cm
2001:0370:0004




6. NAVICULA FISCHERII
ca.1935
gelatin silver print
Image: 7 x 13.6 cm
Mount: 14.4 x 21.3 cm
2001:0370:0005

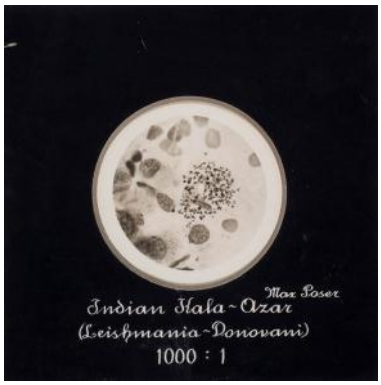


7. Descriptive Title:
Untitled Mount
ca.1935
gelatin silver print
Overall: 40.8 x 51 cm
2001:0370:0006-0009




8. BAC. TETANUS WITH FLAGELLA; SPIR CHOLERA WITH FLAGELLA; BAC. TYPHOSUS WITHFLAGELLA.
ca.1935
gelatin silver print
Image: 7.7 cm (diameter, 3 openings)
Mount: 15.3 x 33.9 cm
Overall: 40.8 x 51 cm
2001:0370:0006

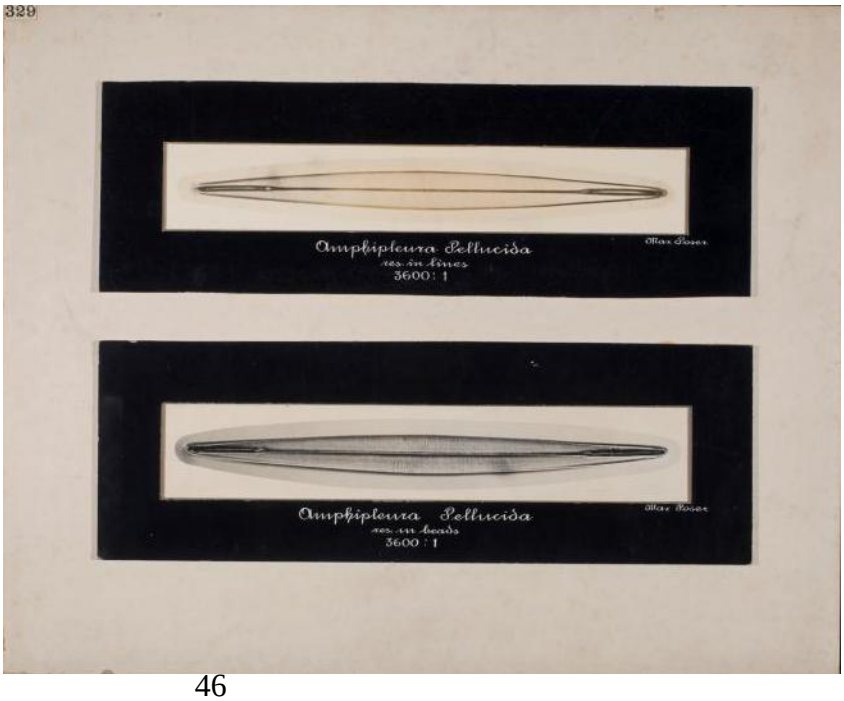

9. INDIA KALA~AZAR
ca.1935
gelatin silver print
Image: 7.7 cm (diameter)
Mount: 15.5 x 15.5 cm
Overall: 40.8 x 51 cm
2001:0370:0007



10. TRYPANOSOMA LEWISI
ca.1935
gelatin silver print
Image: 7.7 cm (diameter)
Mount: 15.5 x 15.5 cm
Overall: 40.8 x 51 cm
2001:0370:0008


11. DIPHTHERIA
ca.1935
gelatin silver print
Image: 7.7 cm (diameter)
Mount: 15.5 x 15.5 cm
Overall: 40.8 x 51 cm
Gift of Walter J. Clark
2001:0370:0009

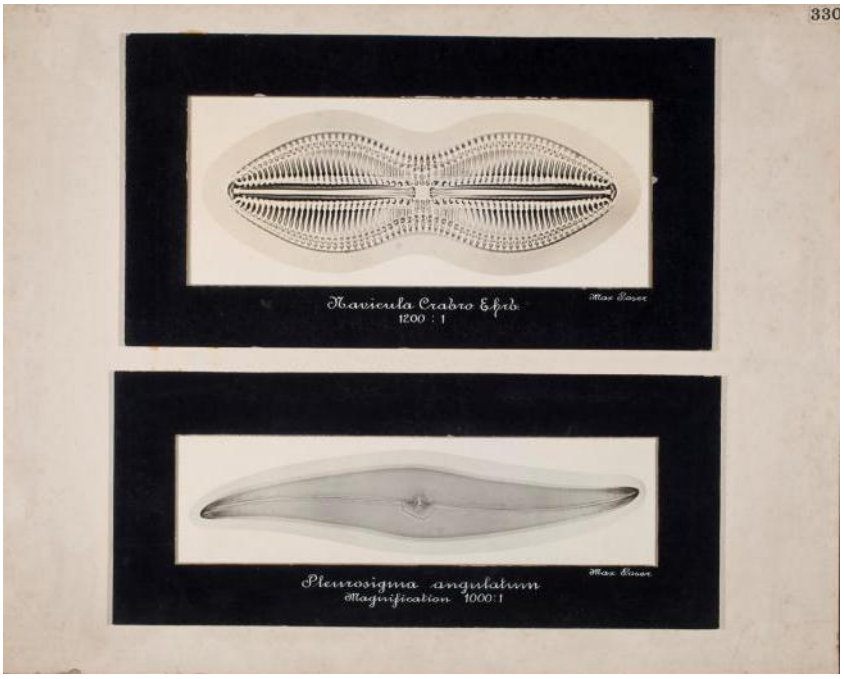

12. MOUNT 329
ca.1935
gelatin silver print
Overall: 40.8 x 51 cm
2001:0370:0010-0011



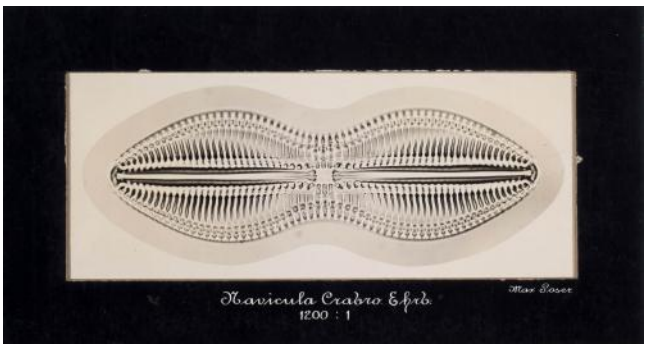
13. AMPHIPLEURA PELLUCIDA
ca.1935
gelatin silver print
Image: 31.5 x 5 cm
Mount: 12.7 x 39.2 cm
Overall: 40.8 x 51 cm
2001:0370:0010


14. AMPHIPLEURA PELLUCIDA
ca.1935
gelatin silver print
Image: 31.7 x 5.8 cm
Mount: 13.2 x 39.4 cm
2001:0370:0011


15. MOUNT 330
ca.1935
gelatin silver print
Overall: 40.9 x 51 cm
2001:0370:0012-0013

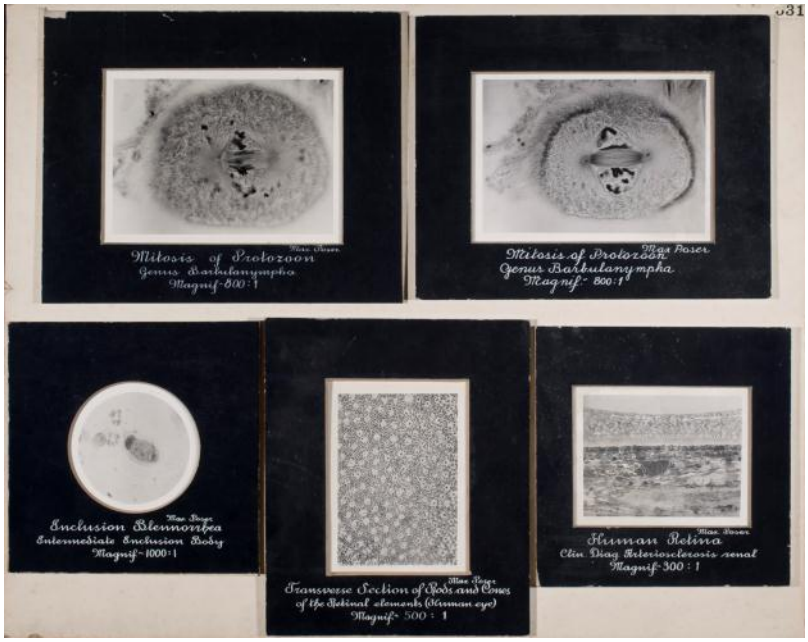



16. NAVICULA CRABRO EHRB.
ca.1935
gelatin silver print
Image: 11.2 x 27.7 cm
Mount: 18.6 x 35.2 cm
Overall: 40.9 x 51 cm
2001:0370:0012



17. PLEUROSIGMA ANGULATUM
ca.1935
gelatin silver print
Image: 7.7 x 29 cm
Mount: 15.3 x 36.4 cm
Overall: 40.9 x 51 cm
2001:0370:0013


18. MOUNT 331
ca.1935
gelatin silver print
Overall: 40.8 x 51 cm
2001:0370:0014-0018

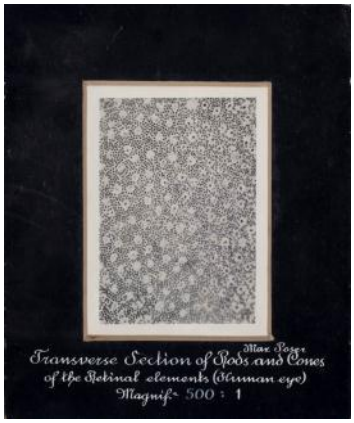



19. MITOSIS OF PROTOZOON
ca.1935
gelatin silver print
Image: 11.1 x 15.2 cm
Mount: 18.4 x 22.7 cm
Overall: 40.8 x 50.8 cm
Gift of Walter J. Clark
2001:0370:0014


20. MITOSIS OF PROTOZOON
ca.1935
gelatin silver print
Image: 10.8 x 15.2 cm
Mount: 18 x 22.4 cm
2001:0370:0015

21. INCLUSION BLENNORRHEA
ca.1935
gelatin silver print
Image: 8.2 cm (diameter)
Mount: 15.6 x 15.5 cm
2001:0370:0016

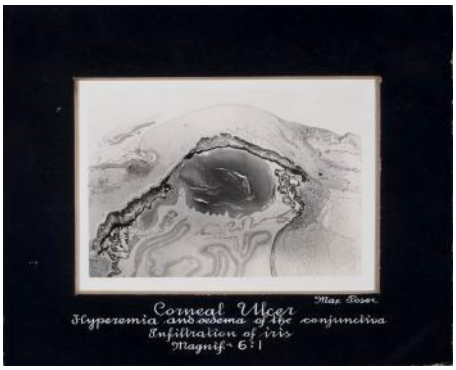

22. TRANSVERSE SECTION OF RODS AND CONES
ca.1935
gelatin silver print
Image: 12.1 x 8.6 cm
Mount: 20 x 16.5 cm
2001:0370:0017



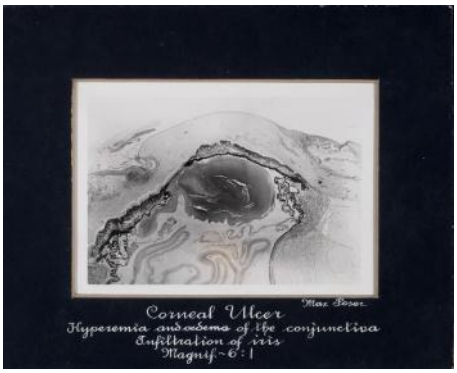

23. HUMAN RETINA: ARTERIOSCHEROSIS RENAL
ca.1935
gelatin silver print
Image: 8.7 x 11 cm
Mount: 16.4 x 16 cm
2001:0370:0018


24. ARACHNOIDISCUS EHRENBERGII
ca.1935
gelatin silver print
Image: 22 cm (diameter)
Mount: 29.5 x 29.8 cm
2001:0370:0019

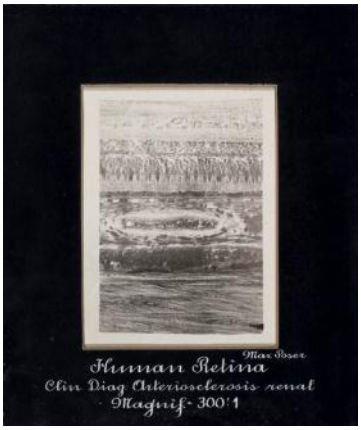
25. CORNEAL ULCER
ca.1935
gelatin silver print
Image: 11 x 15.5 cm
Mount: 18.7 x 23.2 cm
2001:0370:0020



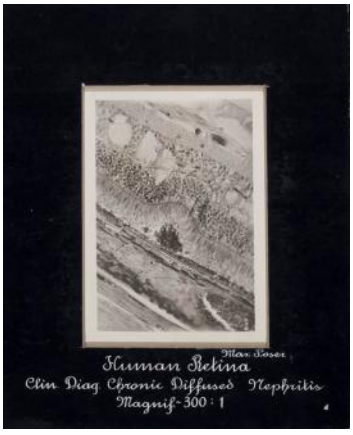

26. CORNEAL ULCER
ca.1935
gelatin silver print
Image: 11 x 15.5 cm
Mount: 18.5 x 23.2 cm
2001:0370:0021




27. HUMAN RETINA:
ARTERIOSCHEROSIS RENAL
ca.1935
gelatin silver print
Image: 12 x 9 cm
Mount: 19.4 x 16.4 cm
2001:0370:0022

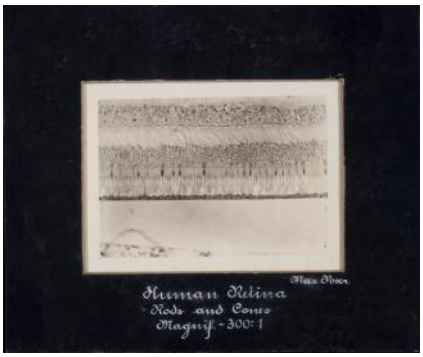



28. HUMAN RETINA
ca.1935
gelatin silver print
Image: 11.5 x 8 cm
Mount: 19.2 x 15.9 cm
2001:0370:0023



29. HUMAN RETINA: WHORL
ca.1935
gelatin silver print
Image: 8.8 x 12.2 cm
Mount: 16.4 x 19.8 cm
2001:0370:0024


30. HUMAN RETINA: RODS AND CONES
ca.1935
gelatin silver print
Image: 9 x 12.2 cm
Mount: 16.3 x 19.6 cm
2001:0370:0025



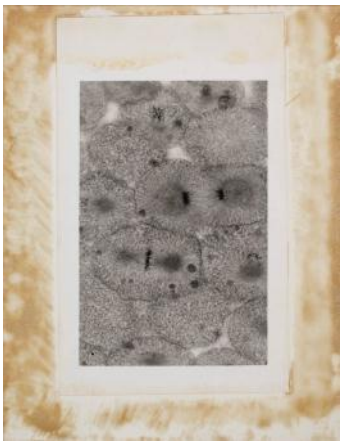

31. Descriptive Title: Photomicrograph of part of the human eye
ca.1935
gelatin silver print
Image: 10.5 x 7.6 cm
Mount: 16.5 x 19.5 cm
2001:0370:0026

32. GANGLION CELLS AND NONMEDULLATED NERVE FIBERS IN THE CHOROID
ca.1935
gelatin silver print
Image: 11 x 15 cm
Mount: 18.4 x 23 cm
2001:0370:0027

33. Descriptive Title: Photomicrograph
ca.1935
gelatin silver print
Image: 9.7 x 14 cm
Mount: 18.5 x 22.8 cm
2001:0370:0028

34. WHITEFISH BLASTULA MITOSIS
ca.1935
gelatin silver print
Image: 11.4 x 16.5 cm
Mount: 18.4 x 23.5 cm
2001:0370:0029


35. Descriptive Title: Photomicrograph of cells
ca.1935
gelatin silver print
Image: 10.2 x 15.4 cm
Mount: 18.3 x 23 cm
2001:0370:0030



36. Descriptive Title: Photomicrograph of cell mitosis
ca.1935
gelatin silver print
Image: 12.5 x 20.5 cm
Mount: 18.3 x 23.8 cm
2001:0370:0031

**BIBLIOGRAPHY**

"The Century of Progress Exposition." *The Educational Focus* 4, no. 1 (1933): 22-23.

[Shilling, Donovan A.?]. *A Photographic History of Bausch & Lomb.* Rochester, NY: Bausch & Lomb, 2011.

"First International Exhibition of Scientific and Applied Photography." *Journal of the Photographic Society of America* (1937): 1-11.

Albin-Gulliot, Laure. *Micrographie Décorative*. Paris: Draeger Frères, 1931.

Appadurai, Arjun. Introduction to *The Social Life of Things: Commodities in Cultural Perspective*., Cambridge: Cambridge University Press, 1988.

Art Center College of Design. "Art Center's History." The Art Center College of Design. http://www.artcenter.edu/accd/about/history.jsp (accessed May 16, 2012).

Barnard, Joseph E. *Practical Photo-Micrography*. London: E. Arnold & Co, 1925.

Bausch & Lomb Optical Company. *Story of Bausch and Lomb*. Rochester, NY: Bausch & Lomb, c.1940.

Bausch & Lomb. "About Bausch & Lomb." Bausch & Lomb Optical Company. http://www.bausch.com/en/Our-Company/About-Bausch-And-Lomb (accessed June 3, 2012).

Carlson, Frank E. "Know Your Society: The Technical Division." *Journal of the Photographic Society of America* (1946): 405-406.

Connor, J.T.H. "Photomicrography." In *Encyclopedia of Nineteenth Century Photography,* edited by John Hannavy, 1120-22. New York: Routledge, 2008.

Davidson, Michael W., Scott Olenych, and Nathan Claxton. "Photomicrography." In *Focal Encyclopedia of Photography: Digital Imaging, Theory and Applications, History, and Science*, 4th ed., edited by Michael R. Peres, 592-602. Boston: Focal Press, 2007.

Donné, Alfred. *Cours de Microscopie Complémentaire des Etudes Médicales.* Paris: J.-B. Baillière, 1845.

Eastman Kodak Company. *Photomicrography: An Introduction to Photography with the Microscope*. Rochester, NY: Eastman Kodak Company, 1935.

----------. *Photography Through the Microscope*. Rochester, NY: Eastman Kodak Company, 1952.

*First International Exhibit: Scientific Applied Photography.* Rochester: Rochester Technical Section of the Photographic Society of America, 1937. Published in conjunction with the exhibition

"The First International Exhibition of Scientific and Applied Photography" shown at the Rundel Library in Rochester, New York.

Ford, Brian J. *Images of Science: A History of Scientific Illustration*. New York: Oxford University Press, 1993.

Fyfe, Aileen. *Science in the Marketplace: Nineteenth-Century Sites and Experiences*. Chicago: University of Chicago Press, 2007.

Gage, Simon H. "Microscopy in America (1830-1945)." *Transactions of the American Microscopical Society* 83, no. 4 (1964): 3-116.

George Eastman House. "Mission Statement." George Eastman House, International Museum of Photography and Film. http://www.eastmanhouse.org/museum/mission.php," (accessed June 3, 2012).

Gross, Alan G., Joseph E. Harmon, and Michael Reidy. *Communication Science: The Scientific Article from the 17th Century to the Present*. New York: Oxford University Press, 2002.

Hooper-Greenhill, Eilean. *Museums and the Interpretation of Visual Culture*. London, New York: Routledge, 2000.

Keller, Corey. *Brought to Light: Photography and the Invisible, 1840-1900*. New Haven: Yale University Press, 2008.

Knight, David M. *Public Understanding of Science: A History of Communicating Scientific Ideas*. London, New York: Routledge, 2006.

Kopytoff, Igor. "The Cultural Biography of Things." In *The Social Life of Things: Commodities in Cultural Perspective*, edited by Arjun Appadurai. Cambridge: Cambridge University Press, 1988.

Krauss, Rosalind. "Photography's Discursive Spaces: Landscape/View." *Art Journal* 42, no. 4 (Winter 1982): 311-319.

Lee, Jennifer B., and Miriam Mandelbaum. *Seeing is Believing: 700 Years of Scientific and Medical Illustration*. New York: New York Public Library, 1999.

Lightman, Bernard. *Victorian Popularizers of Science: Designing Nature for New Audiences*. Chicago: University of Chicago Press, 2010.

Litchfield, R. *Tom Wedgwood the First Photographer.* London: Duckworth and Sons, 1903.

Lynch, Michael, and Steve Woolgar, eds. *Representation in Scientific Practice*. Cambridge: MIT Press, 1990.

Martin-Duncan, F. "Camera and Microscope in the Service of Mankind." *The Photographic Journal* 77 (February 1937): 74-81.

McCauley, Anne. "Writing Photography's History before Newhall," *History of Photography* 21 (Summer 1997): 87-101.

Neblette, C.B. “Scientific Section Plans International Exhibition of Applied and Scientific Photography.” *Journal of the Photographic Society of America* 2, no. 2 (1936): 11.

Newhall, Beaumont. *Photography 1839-1937.* New York: The Museum of Modern Art, 1937.

----------. *Photography: A Short Critical History.* New York: The Museum of Modern Art, 1938.

Nikon. “Nikon Small World Photomicrography Competition,” Nikon. http://www.nikonsmallworld.com/ (accessed May 14, 2012).

Norman, Daniel. “The Museum of Modern Art: Photography, 1839-1937.” *History of Science and Society* 30, no. 1 (1939): 127-128.

Overney, Normand, and Gregor Overney. "The History of Photomicrography." *Microscopy UK*, (March 2011). http://www.microscopy-uk.org.uk/mag/artmar10/go-no-history-photomicro.html (accessed February 20, 2012).

Pauwels, L. *Visual Cultures of Science: Rethinking Representational Practices in Knowledge Building and Science Communication*. Hanover, NH: Dartmouth College Press, 2006.

Phillips, Christopher. "The Judgement Seat of Photography." *October* 22 (Autumn 1982): 27-63.

Photographic Society of America. “About PSA: PSA History.” The Photographic Society of America. http://www.psa-photo.org/about-psa/psa-history/ (accessed June 14, 2012).

Pittock, F.J. “The Production and Use of Microscopic Sections.” *The Photographic Journal* 77 (April 1937): 207.

Poser, Max. "Biomicroscopy." *The Eye, Ear, Nose and Throat Monthly* (1941).

----------. "Stereo Campimetry." *The Optical Journal and Review* (1919): 457.

----------. "Test Objects for the Microscope." *The Educational Focus* 5, no. 1 (1934): 6-9.

Rosenblum, Naomi. *A World History of Photography.* New York: Abbeville Press, 1997.

Royal Photographic Society. “1907: exhibits by A. E. Smith.” The Royal Photographic Society. http://erps.dmu.ac.uk/exhibits_year2.php?enid=1907&ername=A.+E.+Smith (accessed June 14, 2012).

----------. “1910: exhibits by Max Poser.” The Royal Photographic Society. http://erps.dmu.ac.uk/exhibits_year2.php?enid=1910&ername=Max+Poser (accessed June 14, 2012).

Shelby, John E. *Introduction to Glass Science and Technology*. 2nd ed. Cambridge: Royal Society of Chemistry, 2005.

Shen, Benjamin S.P. "Science Literacy and the Public Understanding of Science." In *Communication of Scientific Information*, edited by Stacey B. Day. Basel, Switzerland: S. Karger AG, 1975.

Sorensen,Lee. "Beaumont Newhall," Dictionary of Art Historians. http://www.dictionaryofarthistorians.org/newhallb.htm (accessed May 12, 2012).

Straw, William. "The Thingishness of Things." *Invisible Culture* (1998). http://www.rochester.edu/in_visible_culture/issue2/straw.htm (accessed June 15, 2012).

Sullivan, Lee. *A Brief History of Bausch & Lomb's First 150 Years*. Rochester, NY: Bausch & Lomb, 2004.

*The 1st International Exhibition of Scientific and Applied Photography*. Los Angeles: Art Center School, 1938. Published in conjunction with the exhibition "The First International Exhibition of Scientific and Applied Photography" shown at the Art Center School in Los Angeles, California.

Thomas, Ann. *Beauty of Another Order.* New Haven: Yale University Press Yale University Press in association with the National Gallery of Canada, 1997.

Topper, David. "Towards an Epistemology of Scientific Illustration." In *Picturing Knowledge: Historical and Philosophical Problems Concerning the Use of Art in Science*, edited by Brian S. Baigrie, 215-250. Toronto: Toronto University Press, 1996.

Troufléau-Sandrin, Carole. "Microscopes." In *Brought to Light: Photography and the Invisible 1840-1900*, edited by Corey Keller, 29–30. New Haven: Yale University Press, 2008.

Tucker, Jennifer. *Nature Exposed: Photography as Eyewitness in Victorian Science*. Baltimore: Johns Hopkins University Press, 2005.

Vickey, Brian C. *Scientific Communication in History*. Lanham, MD: Scarecrow Press, 2000.

Wilder, Kelly. *Photography and Science*. London: Reaktion, 2009.

Willumson, Glenn. "Making Meaning: Displace materiality in the library and art museum." In *Photographs Objects Histories*, edited by Elizabeth Edwards and Janice Hart. London, New York: Routledge, 2004.