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Hindsight: Journal of Optometry History publishes material on the history of optometry and related topics. As the official publication of the Optometric Historical Society, Hindsight: Journal of Optometry History supports the purposes and functions of the Optometric Historical Society.

The purposes of the Optometric Historical Society, according to its by-laws, are:
- to encourage the collection and preservation of materials relating to the history of optometry,
- to assist in securing and documenting the recollections of those who participated in the development of optometry,
- to encourage and assist in the care of archives of optometric interest,
- to identify and mark sites, landmarks, monuments, and structures of significance in optometric development, and
- to shed honor and recognition on persons, groups, and agencies making notable contributions toward the goals of the society.

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On the cover: The drawing represents OHS for Optometric Historical Society: the O an elementary schematic of an eye, the H three intersecting pairs of spectacles, and the S a representation of a light wave with the Greek letter lambda indicating one wavelength. The drawing artist was Diane Goss.

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Testifying Before the U.S. Congress In Behalf of the National Eye Institute, N.I.H., During the Early Years of Its Existence

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Mrs. Enoch and I recently moved our home from Moraga, California, to Kirkland, Washington. In the process of the seemingly unending tasks associated with packing and unpacking of our belongings, I encountered a picture of the late Prof. Edward Maumenee [then Chairman of the Department of Ophthalmology at Johns Hopkins U., Baltimore], and of me testifying to the U.S. Senate in support of the National Eye Institute (NEI), National Institutes of Health (NIH), research budget on May 14, 1975 (Figure 1). In that picture, I call the reader's special attention to a woman with a tin-can-like device placed just in front of her mouth. I will discuss this further below.

Figure 1. Profs. Edward Maumenee and Jay M. Enoch (left) testifying at a hearing in the U.S., Senate in support of the National Eye Institute, NIH, budget on May 14, 1975.
Like in almost everything in life, one has to learn how to do a job correctly. Stated simply, at the outset/early-on, our efforts to support a meaningful Congressional Budget for the then still relatively new National Eye Institute, NIH, were somewhat less polished than we might have liked. So saying, we made up for some of our deficits in experience with sheer enthusiasm for the task. Most of us, with a few exceptions, e.g., Dr. Edward Maumenee, who were asked to testify in support of funding for the new National Eye Institute, NIH, were (at the outset) just not polished performers at the task.

The organization, Research to Prevent Blindness (RPB), was represented often by their then Executive Vice President, Mr. David F. Weeks [who also had served for some years as Mayor of Ho-Ho-Kus, New Jersey]. RPB had meaningful fiscal support from the leadership of the Music Corporation of America [then headed by the late Jules Stein, who had originally trained at Cornell U. Medical School in NYC as an ophthalmologist]. RPB arranged for Congressional testimony in support of the National Eye Institute before both The House of Representatives and The U.S. Senate. I testified in behalf of the NEI before both Houses of Congress on quite a number of occasions between the years 1969-1976.

My first experience in this role (in 1969 or 1970?) was rather wild! RPB put both Dr. David Shoch (now deceased) [then Chairman of the Department of Ophthalmology at Northwestern University Medical School in Chicago], and me [then Research Professor of Ophthalmology in the School of Medicine at Washington University in Saint Louis] up at the lovely old Hay-Adams Hotel which is located just across Lafayette Park from the White House. Then, neither David Shoch nor I had any prior experience at this task. We both had sent our planned testimony for review and comment to David Weeks in advance, and, on the evening before we were to present our testimony, he sought to describe the situation which we would encounter the next day.

On the day we were to present our testimony, Mr. Weeks suggested that we go early to the House of Representatives and to the Senate in order to attend the testimony being presented by those representing other NIH Institutes who were scheduled to speak prior to our participation. We first went to the House of Representatives. The key questioner on the Committee that day was (then) a young Midwestern Congressman, Mr. David Obey. Today, Representative Obey is Chairman of this same Committee. On that day, he was asking very tough/penetrating questions of those making presentations. He truly put those folks on the spot, and kept them there! (I do not mean to imply that this was inappropriate.) This did not do much for our confidence. The first set of testimony that we attended dealt with diseases of the lungs. Sitting next to the presenters was a young woman who periodically was literally gasping for breath (!), and who was breathing into a can-shaped device (e.g., see Figure 1). We assumed she was serving as a display for patients who were then being studied by the Heart and Lung Institute. After listening to the very penetrating and difficult questions raised by Congressman Obey, and to the presenter's attempted responses, Dr. Shoch and I decided it would be to our advantage for us to also have a demonstration patient to underscore/highlight the importance of our testimony. After attending this session for
more than an hour, Dr. Shoch and I left the hearings in order to try to find a blind person with a Seeing Eye Dog to sit with us later in the day. I know this sounds a bit odd, but frankly, we really were quite unsure of what was expected of us. (So saying, our testimony was quite legitimate and very much on point!)

David Shoch and I found a blind (but obviously quite poor) elderly man walking on the street in downtown Washington with a Seeing-Eye Dog. He was a bit ragged, but we felt we needed him as a prop in support of our testimony! We bought him a clean shirt, took him for a shave, and gave him a meal. While a bit (understandably) confused, he kindly came along, and sat quietly with us as we presented our testimony in the afternoon. Yes, we were quite naive!

Finally, it was our turn before the Congressional Committee. Dave Shoch, I, and the polished-up blind gentleman with his dog were called to the table. To our utter amazement, there, sitting adjacent to us was the same lady with "the tin-can", and throughout our testimony she sat there continuing to gasp loudly for breath! Whatever was she doing there? Please note: Figure 1 is dated a few years after this original experience.

To make a long story short, Congressman Obey, and his colleagues could not have been nicer to us during and after our testimony! And we had totally misread the role of this lady! It turned out that she was the legal "court reporter". That is, at a formal hearing before Congress, a legal record had to be taken of statements made for later publication in the Congressional Record. Although we submitted our written statements (from which we read!) to the Chairman of the Committee, she apparently was not allowed to use those. Nor, could she take notes during our testimony. Apparently, she also was not an experienced steno-typist. Rather, she took the record by attempting to repeat "word-for-word" our presentations into a recorder, the mouth-piece of which was placed just in front of her mouth (Figure 1)! So that she did not disturb the speakers (and hence interrupt the proceedings), she "sort-of" whispered into her recording device, and was clearly instructed not to "make a sound." But she just had to take a breath from time to time. Hence, the periodic loud sound she made was a gasp to provide her with sufficient air for her task. In candor, reading the Congressional record of our testimony later, I was not impressed with the product of the system.

After we were finished, we sent the nice/elderly blind gentleman away with a few dollars in his pocket, and with words of appreciation for his participating in this activity. We apparently succeeded in advancing the cause of eye/vision research in behalf of the NEI in both Houses of Congress, and in similar situations at later times. Obviously, this is only one modest piece among the several activities associated with obtaining necessary fiscal support for the annual National Eye Institute research and training programs in support of eye and vision science.

After our not-too-strong a start, I was asked to serve in this role quite a number of times. On later occasions, in this role, I appeared more than once with Prof. Edward
Maumenee, with whom I testified in 1975 (Figure 1). I had known him well, as he also had been a member of the Subcommittee on Vision and Its Disorders...in fact, he was the one who had first greeted me and introduced me to the other members of that fine group of clinicians and scientists. Separately, he invited me to review his entire research set-up at Wilmer Eye Institute on two occasions. He also asked me to come to Hopkins for a variety of purposes over the years. Once, he asked me to calibrate the luminance of visual acuity test devices in all of the refracting lanes at Wilmer Institute. Sadly, no two of these test instruments had the same luminance! (I recommended that meaningful changes be made). On another occasion, Ed had been asked to refract President Eisenhower (at that time, the Chancellor of Johns Hopkins University was the President's brother). That day, Ed placed me in the adjacent examining room and repeatedly consulted me during his examination of the President.

On yet another occasion, both Ed Maumenee and I were scheduled to testify before the Senate. We were getting ready to present our testimony before Senator Hollings. Suddenly, to the side of the room, a door opened and in walked a woman of "a certain age". This pleasant lady was dressed rather plainly, but neatly. She turned out to be Mrs. Albert Lasker. She walked in and purposely sat down just behind me! The Laskers had made their fortune in the shoe business. Before this and for some years afterward, Mrs. Lasker played a critical role in the development of the NIH and NEI! Almost immediately after her arrival, a number of senatorial aides literally ran out of the Senate Meeting Room! Some minutes later, in dashed a number of the absent Senate Committee members with their aides. I vividly remember the late Senator Jacob Javits literally running-in as fast as he could, and pumping away on his rather short legs. I had no illusions that they had come into the hearing room to see me (or Ed Maumenee)! I may have been reading my testimony, but all eyes were on her! In candor, in a sense, it did not matter what either Ed or I said; rather, her presence carried the day. An analogy today might be Bill Gates or Paul Allen of Microsoft, or perhaps Steve Jobs of Mackintosh/Apple. Frankly, we very much appreciated all the help we could get!

I could go on in a similar manner. These activities were important, sometimes they were confusing, but, above all, they were critical to NEI, and had to be managed in an appropriate manner.
The American Academy of Optometry is a relatively young organization, having been officially founded in 1922; however, reference to it was made nearly two decades before that. Unfortunately, actual minutes and original documents of the formative years are scarce. It was not until 1960 that reports on the activities and news of the Academy began to be filed and saved.

An interesting question is when exactly did women join the Academy as “Fellows” or in any other capacity? It appears that nowhere is that specific information recorded.

Unfortunately, the Academy had no formal place for storing its archives, so searching for files on the role female optometrists played in the early years of the Academy are not readily accessible. We have uncovered a lot, however, in our research.

Readers need to keep in mind that there were no laws regulating optometry until 1901 and the main organization representing the budding profession was the American Optometric Association which came into being in 1898. Many times from the early 1900s to 1922 there were numerous starts of a separate “national” optometric organization that would emphasize education – each of which spurted and sputtered and stopped. Some may conjecture (humorously, I think) that the Academy had a slow beginning because it did not have the helping hand of both sexes.

Eugene G. Wiseman, an eventual founder of the Academy, for the 15 years before the Academy was officially founded, used the slogan, "Wanted: 1000 men" (italics are mine) as a rallying cry for getting more optometrists to form an educational organization. He tempered his language for a push to getting more “optometrists” after he became President in 1934.

It must be noted, in all fairness, that the list of the names of attendees to the origination meeting for the American Academy in St. Louis on January 11, 1922 contained only initials instead of first names. Were these females? Sorry, we do not really know but the chances are they were not.

The very first reference we found to “women” in the Academy came from the Eighth Annual Meeting of the Academy, held in Boston. Carel Koch was the Chairman of the Academy at that time and he appointed a “Committee on New Instruments and Techniques.” He stated, “To enable members of this committee to get together and to meet at least several times during the year, I appointed on this committee only men and women [italics are mine] from Massachusetts.”
In 1930, Briggs Palmer, who became Chairman of the Academy that year, wrote a letter to The Optical Journal-Review dealing with the high ethical professional standards of Academy members stating that "A member must conduct his or her practice...." (again, the italics are mine)

The following are some more firsts and interesting findings concerning women in the American Academy of optometry.

It appears that the first published list of Academy members in a geographic directory occurred in 1934. However, two members were on lists dating back to 1929 – Fannie Gassett of Boston, MA and Gertrude M. Martin of Utica, New York. Since we could locate no other earlier listings with female names as members, we might rightfully assume that both Ms. Gassett and Ms. Martin were among the earliest members of the Academy. These are the very first mentioned in any Academy document we could locate, so one of them owns the distinction of being the first woman optometrist in the American Academy.

Besides Gassett and Martin two other female optometrists appear in the 1934 directory: Frances P. Marshall (Washington, DC) and Esther M. Ingram (Winter Haven, FL). Another female optometrist, Ethel S. Griffin of Sioux City, Iowa, did appear on the 1930 list of members but not earlier. Linda Draper, who is in charge of the Archives and Museum of Optometry for Optometry's Charity, did not uncover any Academy membership list for 1927 or 1928; however, the lists for 1923 and 1926 that she did locate do not contain any of the known women's names.

Many female optometrists joined the Academy as "Fellows" in the post World War II era. These include Dr. Dorothy Bergin who graduated in 1945 from the Los Angeles College of Optometry, the predecessor of the Southern California College of Optometry. She was the first woman to have a paper accepted by the Academy for presentation at the Annual Meeting. She was married to Dr. Frank Brazelton, an educator at Southern California College of Optometry (SCCO), and a former Academy President.

Dr. Margaret Dowaliby of West Hollywood, CA was not only an optometric practitioner but also a member of the faculty at the Southern California College of Optometry. She and her sister Pauline became Fellows of the Academy in 1946 and 1956, respectfully. Margaret did much in getting good national public relations for the profession. She had her own weekly radio and then television show. One of the bright lights of her career was that she produced, directed and served as commentator for the first fashion show in eyewear ever presented to optometrists and probably the first staging of its kind in the world. That event occurred in the Crystal Ballroom of the Beverley Hills Hotel in 1950.

Other female optometrists who were early Academy members were: Dr. Lois Bing, who died in 2009 at the age of 99. She joined the Academy in 1953 and was the creator of the Cleveland School Vision Forum that had a national impact. Both Dr. Bing...
and Dr. Margaret Dowaliby were instructors at the first set of postgraduate courses given at Academy annual meetings. That was in December 1955 at the Drake Hotel in Chicago. Eleanore Thill, a 1952 SCCO graduate who taught part time at that college, was another Academy pioneer who eventually became a member of the Board of Trustees at SCCO.

In the more modern era, Dr. Sarita Soni was the only female Academy member to become the President of the American Optometric Foundation (AOF). She was AOF president in 1997-1998. Dr. Penelope Kegel Flom, wife of recently deceased Academy leader, Merton Flom, was the first woman to receive the Glenn Fly Lecture Award.

According to Academy files, the current female optometrist who has been an active Fellow of the Academy the longest is Dr. Gilda Coppola Crozier of Philadelphia. Dr. Crozier is a retired member of the faculty at the Pennsylvania College of Optometry.

Only one woman optometrist ever went through the chairs to become an Academy president. That person was Dr. Joan Exford Korb of Boston, who became a Fellow of the Academy in 1965. In 1982 she was elected to the then Executive Council serving for 14 years, and as the Academy’s president 1993-1994. From 1994 through 1998 Joan served the Academy as the Chair of the International Meeting Committee. Before that she devoted many years to the AOF serving two times on that board from 1981 to 1986 and again from 1998 to 2006. At the Academy meeting held in 2009, Dr. Exford received the Eminent Service Award, an award that honors those persons who have rendered unusual service to the Academy.

Currently, one female optometrist, Dr. Karla Zadnik of Columbus, OH, is in the presidential succession line, as vice-president. She is expected to become president of the Academy on, November 20, 2010.

Reviewers of this article noted several other female Academy members who have made substantial contributions to optometry and to the Academy. Many of these women ODs are still in practice or recently retired. So as not to leave out names inadvertently, I have elected in this article to refer only to those who have had pioneering roles or were the first in some capacity.
Benjamin Martin (1704-1782) and His Writings on the Eye and Eyeglasses

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Abstract

Benjamin Martin (1704-1782) was an English schoolmaster, author, popular science lecturer, optician, and instrument maker. During his diverse career, he sought to introduce improvements to various instruments, including the invention of a unique type of spectacles, which he called "visual glasses." He wrote numerous monographs on a wide range of topics, with optics being his area of greatest expertise. This paper presents a brief biographical sketch of Martin and examines his writings for what he had to say about the eye and eyeglasses.

Keywords: Benjamin Martin, English instrument makers, optics books, optometry books, optometry history.

Benjamin Martin is known to collectors of antique spectacles as the originator and maker of "visual glasses". But he also did many other types of work in his lifetime, including schoolmaster, itinerant popular science lecturer, author, and instrument maker. Millburn, Martin's biographer, notes that Martin "was the supreme non-specialist" and that "although no major scientific discovery perpetuates his memory (there is no 'Martin's Law', or 'Martin's Method'), his name appears, albeit in a minor role, in the histories of a wide range of scientific and related disciplines."

Martin left a prodigious amount of written material, including full-length books, pamphlets, and a magazine designed to be assembled into books. He wrote on a broad range of scientific and non-scientific topics, but if one area of science could be identified as his major field of expertise, it would be optics and optical instruments. This article provides a brief biographical sketch on Martin and then examines his writings for what he had to say about the eye and eyeglasses.

Schoolmaster and Author

Martin was born into an English farming family. Little is known of his childhood, and it is thought that he was largely self-educated. In the early 1730s, Martin ran a school at Chichester, Sussex. His advertisements for the school suggest that "he taught almost everything from writing to astronomy." By 1736 or 1737, he was no longer running the school. It appears that from about 1737 to 1740, he was an author and microscope maker. In the late 1730s, Martin devised an inexpensive portable microscope.
Martin’s first book, entitled *The Philosophical Grammar* was published in 1735, and went through several printings up to 1778. It summarized the current knowledge in various fields of science. That book was followed up, in 1737, by *Bibliotheca Technologica*, which examined other scientific topics and the literary arts. Between 1735 and 1739, Martin also wrote textbooks on arithmetic, trigonometry, geometry, and logarithms. His stated goal was to produce inexpensive textbooks to make the knowledge more accessible.

In 1740, Martin published *A New and Compendious System of Optics*. Millburn considered this book to be Martin’s “first original contribution to the literature on natural and experimental philosophy. Although he drew to some extent on the writings of others, this book, unlike *The Philosophical Grammar*, was based largely on his own practical experience.”

**Itinerant Lecturer and Author**

From about 1740 to 1755, Martin toured England as a lecturer on popular science topics. Martin sought subscribers to his courses, and gave a series of lectures over about twelve evenings. The lectures included demonstrations with various types of equipment. Optics and vision were among the topics he considered. In 1743, Martin published a 126-page book entitled *A Course of Lectures in Natural and Experimental Philosophy, Geography and Astronomy* to accompany his lectures. In 1747, this book was expanded into two volumes in *Philosophia Britannica*. Later editions of *Philosophia Britannica* appeared in three volumes. A 1751 shorter book for persons attending his lectures was *A Plain and Familiar Introduction to the Newton Philosophy* which went through five editions, the last being in 1765.

During the period of time that Martin worked as an itinerant lecturer, he published a number of other monographs. Among them were works on microscopy and electricity and a dictionary. The book on microscopy, *Micrographia Nova*, was published in 1742.

In 1738, and again in 1741, Martin contacted the Royal Society to request that he be considered for Fellowship. He never was elected to Fellowship, perhaps in part because he implied that “Fellowship would be financially advantageous to him.” In his 1741 letter, he stated that Fellowship would help him attract attendees to his lecture courses.

In 1755, Martin launched a periodical entitled *The General Magazine of Arts, and Sciences. Philosophical, Philological, Mathematical, and Mechanical*. The purpose of the “magazine” was to summarize knowledge in a broad range of fields over a number of years, after which the separate topics could be bound into volumes to serve much like an encyclopedia. Martin suggested that readers could “read and digest” material each month before the next material appeared. The subjects covered in the magazine were: (1) physical sciences; (2) geography, geology, flora, and fauna of various countries; (3) non-mathematical “arts and sciences”, including theology, ethics, logic, grammar, geography, history, poetry, pharmacy, etc.; (4) mathematical and mechanical principles; (5) biographies; and (6) miscellaneous. The magazine continued until 1764,
at which time instructions were given on how to assemble the parts into thirteen volumes.

**Optician and Instrument Maker**

In 1756, Martin ceased his itinerant lecturing and set up shop as an optician and instrument maker on Fleet Street in London. He sold a wide variety of scientific instruments and related items, including barometers, thermometers, air pumps, water pumps, magnets, balances, telescopes, microscopes, opera glasses, prisms, spectacles, quadrants, compasses, orreries (solar system models), globes, electrical apparatus, and clocks. He did continue to give popular science lectures in London and to write extensively.

Millburn observed that “Martin was continually trying to improve whatever took his fancy – spectacles, microscopes, domestic clocks, quadrants, bilge pumps – and his London shop provided a practical outlet for his ideas. He quickly built up an extensive business supplying all types of scientific instruments, wholesale and retail, many of them of his own design. In order to develop his instrument business, he used a number of promotional techniques: in particular, he issued priced catalogs of standardized products, he wrote numerous books and tracts describing them, and he gave public lectures explaining their use.”

An example of how widely Martin was known for scientific instruments sales was the fact that he supplied a large number of instruments over a period of a few years to Harvard College to replace instruments they lost in a 1764 fire. Among the many items sold were lenses, prisms, and a model of the eye.

During the period of time that Martin ran his London shop, he was sometimes identified as an optician. He developed his “visual glasses” soon after starting his London business, and he displayed them on his shop sign. He published a twenty-eight page booklet, *An Essay on Visual Glasses* in 1756. It went through four reprintings, the last being in 1760.

*An Essay on Visual Glasses* was the first of at least thirty publications produced by Martin while in his Fleet Street business. During this period of time he wrote tracts on various scientific instruments and other topics, including globes, quadrants, barometers, microscopes, orreries, telescopes, navigation, comets, mathematics, and electrical experiments. In 1759, he published a 120 page book, *New Elements of Optics*. On page viii, Martin stated that he intended for this book to be “a Supplement to my System of Optics, in order to render the Theory of this Science compleat...” Most of the book deals with telescopes and microscopes and how their construction could be improved for better optical quality. He discussed achromatic lenses and suggested adding a fourth lens to microscopes to reduce spherical aberration. In 1765, Martin published *Optical Essays*, in which he wrote about microscopy and observations he made with it, including observations of insect eyes.
Late in his life, Martin brought his son, Joshua Lover Martin, into the business, but the son apparently did not have his business skills. In 1782, Martin was declared bankrupt and he died a few weeks later.\(^3\) Records of the sale of Martin's holdings to satisfy the claims of his creditors show that he held a very large inventory. Among the items in the sale were over 50 lots of mirrors, lenses, and prisms, over 200 telescopes, 40 microscopes, and over 500 pairs of spectacles.\(^7\)

**Martin's Writings on the Human Eye and on Eyeglasses**

Martin's *Essay on Visual Glasses* was the only one of his publications devoted exclusively to the eye and eyeglasses, but there was significant coverage of the human eye and spectacles in at least five of his other publications.

*A New and Compendious System of Optics (1740).* This book contained xxiv + 295 pages. The 295 pages were divided into three parts: Of Catoptrics, Of Dioptrics, and Of Dioptric Instruments and Machines. Over 100 pages in Part III was devoted to microscopes and telescopes, but 18 pages examined the eye. Martin noted that his description of the eye was "rather optical than anatomical." After a brief discussion of ocular structure, he described ocular image formation along with accommodation and pupil function.

Next Martin discussed the "Position of the Image in the Eye" and "the apparent Magnitude of Objects." Martin stated incorrectly that "Vision is performed in the Eye by Refraction through the Crystalline Humour principally..." (page 148). Martin correctly noted that the ocular image is inverted. He also discussed the relation of retinal image size and object distance to size perception.

The next topic is "Of the Faults or Defects of Vision, and how they are remedied by Convex and Concave Lenses in Spectacles." On page 154, he stated that: "...Glasses may be formed to such a Degree of Convexity or Concavity, that upon applying them to the Eye, the Focus shall be truly adjusted to the Retina, and thereby cause distinct Vision." (page 154) He next explained how convex lenses were optically of benefit in presbyopia.

On pages 155-156, Martin offered this explanation for the cause of presbyopia: "...in Youth the Eye was so convex, as to form an Image of nigh Objects on the Retina, in Age that Convexity of the Eye diminishing will cause the Images of the same Objects to be painted at a Focus farther from or behind the Retina; and those Objects only which are at great Distance, will have their focal Distance short enough to fall on the Retina; and so these only can produce distinct Vision."

Also on page 156, Martin noted that a person with myopia "is with good Reason said to be short-sighted; for since all distant Objects have the shortest focal Distances, and so have their Images formed short of the Retina, they must needs appear indistinct and confused. Therefore only those Objects which are at a short or near Distance, can produce distinct Vision; and that they do by having a longer focal Distance, and so reach the Retina before their Images are formed."
Micrographia Nova (1742). Martin patterned this 62 page book after Robert Hooke's Micrographia (1665). The book contained one part on microscope instrumentation and methods and another part on objects that can be seen with a microscope. One of the objects Martin described was the retina and the branching of retinal blood vessels on it.15

A Course of Lectures in Natural and Experimental Philosophy, Geography and Astronomy (1743). This book was divided into twelve lectures.16 One of the lectures was on light and color and two of the lectures were on vision and optical instruments. The eye content of this book will be considered with the discussion of Philosophia Britannica because the latter was an expansion of A Course of Lectures.

An Essay on Visual Glasses. This booklet was first published in 1756. A fourth edition was published in 1758 and a fifth edition in 1760. The fourth edition is a 32 page booklet with the main part dealing with visual glasses and the last eight pages consisting of "Directions for the Use of the General Apparatus of Optical Instruments" and "A Catalogue of Philosophical, Optical, and Mathematical Instruments Made and Sold by Benjamin Martin."

In the opening paragraph, Martin stated that he would "treat, in a brief Manner," the use of spectacles "in assisting the Eye to see Objects distinctly, when the natural Form and Condition of it fail us; and to shew what is the necessary Construction or Disposition of those artificial Glasses for answering that important Purpose in the best Manner possible."

On page 4, Martin asked "how forlorn would the latter Part of most Men's Lives prove, unless Spectacles were at hand to help their Eyes, and a little formed Piece of Glass supplied the Decays of Nature? The curious Mechanic, engaged in any Minute Work, could no longer follow his Trade than to the 50th or 60th Year of his Age. The Scholar no longer converse with his Books, or with an absent Friend in a Letter. All after would be melancholy Idleness, or he must content himself to use another Man's Eyes for every Line."

Martin noted that when he started needing spectacles himself, he "resolved at once to have a Pair as perfect as my Skill in Optics and the Form and Make of the Eye could direct me to construct..."(page 6). He noted that the two lenses in spectacles usually had their axes parallel. He instead designed his "visual glasses" such that the lenses were at an angle to each other such that the axes of the lenses would coincide with the axes of the eyes when looking at objects at near. Suggesting that too much light weakened the eye, he developed a rim around each lens to serve as a diaphragm. Next he suggested that of the colors, the "Action on the Eye will be easiest" for violet. He expressed the opinion that "Vision by a coloured Glass is most of all perfect, and should be chose by every judicious Person, where an exquisite View of the Object if required." (page 9)
On pages 9 to 14, Martin gave a brief overview of eye structure and image formation. On page 15, he started a comparison of "vulgar Spectacles" and those he "recommended of a new and philosophical Construction". He discussed the importance he attached to the orientation of the axes of the lenses (pages 15 to 18), to limiting the amount of light entering the eye (pages 18 to 21), and to the use of violet lenses (pages 21 to 22).

To reduce the amount of light entering the eye, he attached "a large opake Zone or Ring of black Horn" (page 20) around the outer edge of the lens. He noted that the common size of spectacle lenses was an inch and a half diameter. His visual glasses had lenses of that diameter, but with the ring of horn approximately one-fourth inch wide around the outer part of the lens, the patient viewed through a circular area an inch in diameter.

On pages 22 to 24, Martin promoted his visual glasses and defended them against his detractors. For example, he said: "Since I have proposed these Visual Glasses, I have the Pleasure to find that they are greatly approved of, and very well received, even beyond my Expectation." (page 22) Further, he stated that he "shall take no Notice of the low Arts that have been practiced to vilify this Invention..." (page 23) Additional information on Martin’s visual glasses can be found in the article by Letocha.¹

**A Plain and Familiar Introduction to the Newtonian Experimental Philosophy.** The first edition of this book appeared in 1751. The fifth edition, which was published in 1765, is composed of 164 pages. Martin noted that the book was designed for persons who had attended or might in the future attend his public lectures. Pages 36 to 39 include a brief discussion of vision and pages 39 to 43 of ocular anatomy, ocular image formation, and use of spectacles to correct myopia and presbyopia. A sentence on page 43 suggests that his courses included an eye dissection and the examination of a model eye: "Every thing hitherto advanced in regard to Vision, and the Defects thereof, together with their Remedies by Glasses, are shewn by the Dissection of the natural Eye, and Experiments with an artificial Eye, representing every Part, and the Effects of the natural Eye completely."

**Philosophia Britannica.** This book, which Martin also wrote as a companion to his lectures, appeared in four English language editions, the first in 1747, and the fourth posthumously in 1788. The primary text for this book was duplicated from Martin’s Course of Lectures. Very extensive footnotes were added such that the footnotes constituted much more area in the book that the primary text. The initial edition of Philosophia Britannica appeared in two volumes and later editions were in three volumes.

In the 1788 fourth edition, the eye and vision are covered on pages 27-42 of volume 3. About three-fourths or more of the material on pages 27 to 38 is in the form of footnotes, mostly on ocular optics. On page 29, he gave average dimensions of the eye. For example, he said that the average diameter from six adult eyes was 0.94 inch, which converts to about 23.9 mm. For average "radius of convexity of the cornea," he
gave 0.33294 inch (about 8.46 mm). The value he presented for crystalline thickness was 0.18525 inch (about 4.70 mm), and for the sum of corneal thickness and depth of the aqueous humor, 0.10358 inch (2.63 mm).

Refractive conditions are discussed in general terms on pages 39 to 42 in large print without footnotes. Thus we could assume that such material was duplicated from A Course of Lectures. This is what Martin says about myopia: "A purblind Person, having the Convexity of the Eye and Crystalline Humour too great, will have the Rays united in a Point before they reach the Bottom of the Eye...This Defect of the Eye is remedied two Ways, viz. (1) By diminishing the Distance between the Object and the Eye...(2) By applying a concave Glass to the Eye." (page 39)

In the list of books consulted for the composition of the three volumes of Philosophia Britannica, Martin included these on optics: A Compleat System of Optics, Smith; Lectiones Opticae, Newton; Optics, Newton; and An Essay on Distinct and Indistinct Vision, Jurin.

Comments

I originally set out to study Benjamin Martin's life because of his invention of "visual glasses" and his authorship of the booklet about them. As I read more about him, I found that he was not only an optician, but also a schoolmaster, a very prolific author, a lecturer on popular science, and a maker and seller of scientific instruments. Millburn noted that Martin's bankruptcy late in life suggests that although he was not as financially successful as some of his contemporaries, "it was simply not in Martin's nature to concentrate for any length of time on one subject; he was essentially a jack-of-all-trades, and though he did not make a fortune he undoubtedly had the more colourful and interesting life."19

References

1. Letocha CE. Benjamin Martin's visual glasses. Hindsight: J Optom Hist 2010; 41:
Benjamin Martin’s Visual Glasses

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Introduction
Benjamin Martin’s life and work has been studied extensively by John R. Millburn, who has published three books on this subject.1-3 Most of the information in this paper comes from those three books. I also acknowledge the help of Alan McBrayer of Charlotte, North Carolina for all the information concerning glasses with rims in America and for copies of the Jones and Bidstrup catalogues. I should point out that he and I have different feelings about how long visual glasses were available and about whether 19th century examples should actually be considered “visual glasses”.

Visual Glasses
Martin probably moved to Fleet Street in London in early 1756. His shop was located near the entrance to the Royal Society and members approaching that building would have had to pass near Martin’s shop. London streets were not numbered until a decade later when that shop became 173 Fleet Street. He moved to 171 Fleet Street in 1759. The shop between those two buildings (172 Fleet) was operated by John Cuff, best known for his microscopes and one of the last scientific instrument makers to do all the work himself. Cuff was so offended by Martin’s advertising and puffing that he moved to 132 Fleet Street in 1757. Martin’s building was identified by his sign of the Visual Glasses and Globe. It appears that he began selling visual glasses as soon as he moved to London, although the earliest advertisement found thus far is from July, 1756. Scientific instrument makers did not have a guild of their own and they were free to join any guild; surprisingly, many were members of the Grocers Company, but Martin joined the Goldsmiths Company. There is strong circumstantial evidence that Martin did not actually make the articles he sold in his shop, including visual glasses. Rather, he probably had a few workers in the shop and subcontracted work to various journeymen around London.

Conveniently for historians, Martin issued a booklet explaining visual glasses with each pair he sold. This was published initially in 1756 and reprinted 4 times until 1760. Martin devised visual glasses as a result of his own presbyopia. He listed several problems with “common spectacles”:

1. The glasses are placed in the same plane, rather than converging toward the object of regard.
2. That angle causes the rays of light to be refracted irregularly toward the eye.
3. Cumulative light exposure is harmful to the eye and they admit three times as much light as is necessary for clear vision.
4. A particular quantity of light is proper for perfect & distinct vision; common spectacles impair and confuse the image.
5. The large lens size permits irregular refraction from the periphery of the lens.
6. Red light is composed of the largest sized particles and blue the smallest. Common spectacles of clear glass or colors such as green admit the larger sized particles that are not as refrangible as the smaller particles (this was based on one of Isaac Newton’s observations).
7. The image through a properly colored lens is more perfect than through a clear one.

His solution was “visual glasses”. Their properties included the following:

1. The lenses were tilted inward toward the object of regard. The purpose was to have the refraction occur through the center of the lens more so than the periphery.
2. The lens was reduced from a diameter of 1½ inches to ¾ inch by an annulus of horn. This lens admitted 1/3 the amount of light of a standard one. (In actuality, the lens was made 1 inch in diameter: “since custom, the great tyrant against reason, generally has made people expect so great a degree of light, we have thought proper to indulge them with a circular area of light one whole inch in diameter, and therefore they ought not to complain.”)
3. The lenses were colored blue or violet, rather than being clear or, worst of all, green (by 1759, his advertisements no longer mentioned the violet color)

Martin advertised his new invention fairly regularly throughout 1756 and into 1757. That, combined with the lectures he gave on a regular basis, bred anger and consternation among the other opticians and scientific instrument makers, many of whom had shops near his.

Advertising Battles

In the latter half of 1756, there was a running battle between Martin’s advertising his visual glasses (or, as he called them in one ad, “Philosophical Spectacles”) and the reaction by James Ayscough, another prominent optician. On September 22, Martin ran an ad extolling their virtues: “constructed on the genuine principles of optics for preserving the eyes, and rendering vision the most easy and distinct that is possible; this is granted by all who are versed in the science of optics, and is confirmed by the most ample experience, since the greatest part of what is sold is by the recommendation of those who bought and proved them; this new method does not in the least inhaunce the price; and so far are they approved by the intelligent part of mankind, that Mr. Martin has not sold ten of the common sort since these new visual Glasses have been advertised...the retail price in temple frames from 2s 6d to 5s 6d, the common visuals [i.e., nose spectacles] 1s 6d.

On October 19, Ayscough placed an advertisement stating: “the public have been amused with several advertisements relating to visual glasses, the author of which pretends to be the inventor, and would endeavour to persuade the public he has more knowledge than any of the optical trade, and farther has presumed to threaten those who shall oppose him, I therefore dare to tell him, that it is an imposition, and that he never invented any visual glass whatsoever; and I further declare, that the...
he sells under that denomination, are made of the most inferior kind of glass, and defy him to prove the contrary.”

An anonymous ad 2 weeks later was a bit more tongue-in-cheek: “For the publick good, the 6th of November next, will be exhibited to sale, a large assortment of visual glasses, originally invented by the Great Friar Bacon, and now reduced to the true contracted rules of a modern minute philosopher, and the price proportioned to the present interest of money, will be sold by all the artificers from Limehouse-Hole to Hyde-Park Corner, from 1s 6d to 4s 6d and if pebbles for 14s. Twenty per cent. Allowed for those who take a quantity. N.B. Be careful to ask for the true visual glasses, to prevent being imposed on by the Vinegar sort, the consequence of which last, after little use, are so pemicicious, you would not discern a Marten from a Goose.”

Ayscough demanded a reply to his accusations but Martin never did so. In apparent exasperation, Ayscough placed a long, final advertisement on December 6. “The public have been amused with several advertisements relating to Visual Glasses, the author of which pretends to be the inventor, (although these things were made by me, and others occasionally, many years ago) and have still the assurance to insinuate to the public, he has more knowledge than any of the optical trade, and has presumed to threaten those who shall oppose him. I dare to tell him it is an imposition, and that he never invented any visual glass whatsoever; and I further declare, that the spectacles he sells under that denomination, are of the most inferior kind of glass, particularly that sort recommended in his essay. As the glass is the most material part to be considered, I have some years since, and still continue to recommend a kind of glass, as being fitter for the purpose of spectacles than any other sort whatsoever; on these accounts it is harder, freer from veins, and, being of a greenish cast, takes off the glaring light, so much complained of in the white, yet so transparent as not to be liable to the objections so justly made to those of deeper colours. With regard to the frames, I must observe those are easiest which press neither on the nose or temples and I do assert that the less curvature the better, and as large as can be in diameter (except when the focus of the glasses are very short) so that the pupil of the eye be exactly in the center of the glass; this I am certain by experience will be found much more advantageous than the small ones. Since therefore that Visual Advertiser has not thought proper to answer my former advertisements, nor modest enough to desist from his own, I am (tho' I detest advertising) laid under an obligation in just defence of myself and brother traders from being injured in our natural right, and the public in general farther deceived, thus openly to call on the author to lay aside all mean artifices, and new coin’d expressions like Quacks and Mountebanks, but as a just, upright, and honest trader, put a stop to any farther disputes, or trouble to the public, by fairly, and fully answering this advertisement, off to the public. By their much obliged humble servant, James Ayscough, of whom may be had, a Short Account of the Eye, and Nature of Vision, with Observations on a Treatise lately published, intitled An Essay on Visual Glasses.”
observations on his former works, compiled only from the better authors, than that they would pass tolerably well, were the errors corrected by some more judicious person. But I cannot help taking notice, how much he must be wanting in sense and modesty, as a lecturer on philosophy, not to know, that he who at Chichester could pass for a conjuror, can be held but in little esteem in this metropolis, where so many of far superior abilities have so often already exhibited their performances. The few remarks to be made shall be very concise: but whether to laugh at his ignorance, or be angry at his impudence, is what I am at a loss about, therefore shall leave that to those who read this pamphlet. “[Martin] ought to know that all lenses, even combined ones, much more single ones, bear a proportional degree of aperture in proportion to their several foci” and that, in consequence, lenses of 60 inches and 4 inches would bear apertures of 3 inches and 1 inch respectively. “[Martin] recommends a composition contrary to the best philosophy, contrary to his own explanation of vision, and what is more unfortunately, a kind of glass not to be met with but by the greatest difficulty, and that indeed very bad, as this minute philosopher can produce a specimen of.” “He sells spectacles made of the most inferior kind of glass, namely, the white flint; which is fuller of veins and specks than any other, except that which he recommends.”

Popularity

Apparently, the visual glasses were popular immediately. This was probably one of the sources of consternation to the established London opticians. It would also appear that some of them began copying the Martin form. In the Essay on Visual Glasses, Martin commented “those who weakly insinuate that I imitate them, must be told, that they publish an untruth; I have no reason for doing that; their inventions are too mean and unscientifical to deserve my notice: I sell little besides what I have contrived myself; and my instruments will recommend themselves to all judges of science; and not only that, but save the public cent. per cent. in buying. I have only one favour to ask these worthy gentlemen, and that is, that, since they have taken so much pains to depreciate my inventions, they will act consistent with themselves and not imitate them. Let them who know nothing of optics, make spectacles; and those, who profess not to use their reason, buy them; I shall always find a demand for VISUAL GLASSES; and the generous and judicious part of mankind will readily distinguish between the author of any useful invention, and those who basely pirate the same.” Apparently, the piracy had started as early as 1756, because in a December advertisement that year Martin stated: “As the visual glasses are pyrated by many of the trade, Mr. Martin doubts not but the public will be so generous, as to have a proper regard to him as the inventor.” By May 4, 1757, Martin was apparently marking his glasses: “those persons who at first most virulently exclaimed against them, and used every mean in their power to depreciate them, have now basely submitted to pirate the same, but it is presumed they will meet with as little encouragement from gentlemen of honour and generosity, as such disingenuous practices deserve; and that the public may not be deceived, the initial letters of my name, (viz. B.M.) are put on all of my make...” And, in a 1757 broadside: “every sort of visual glasses of my make are marked with the initial letter of my name (B.M.). Of some interest, then, is a price list from 1762 and others of later years, in which Martin says: “N.B. the Visual Glasses sold by peddlers, Jews, &c. with the initial of my name, were never made or sold by me.” This
presents an interesting dilemma to the collector of spectacles: are the ones marked “B.M.” genuine or made by his competitors? Clearly, they could be either. My guess is that so much piracy of the “B.M.” mark occurred that there were probably more copies than Martin originals available and he was better off not placing the mark.

Criticisms and responses to them

Criticisms of visual glasses must have occurred immediately or were anticipated by Martin because he gave responses to them in his Essay.

1. A customer said he could not see better to read with them, or find them easier on the eyes than common spectacles. Martin’s response was that a response should not be noted immediately but only after having worn them for a sufficient period of time.
2. Another customer said that he did not find the light to hurt his eyes any more with common spectacles than with visual glasses. Martin’s response was similar in that the benefit would accrue in the future, not immediately upon using them.
3. Visual glasses have an uncouth look. Martin’s answer: “...to a judicious person, whatever is best, has the best look; and they sit most properly in that position which nature has directed.”
4. They are more expensive than regular spectacles. Martin’s reply: “nor are they dearer than the common sort, viz, from 2s.6d to 5s.6d and the best temple visuals with pebbles at 18s a pair.” An advantage that Martin did not specify himself is that they might have reduced the price of spectacles made of pebbles by reducing the size of the lens needed. Pebble spectacles were significantly more expensive than ones made with glass lenses.

Visual Glasses in America

A 1766 letter from Virginia to England includes a postscript: “Mrs. Nelson begs you to send her a pr. of Mr. Martin’s visual glasses for one of 48 or 49 years old.” Advertisements can be found for Gararous Duyckinck in the New-York Mercury of October 6, 1766, for James Craig in the Virginia Gazette of April 7, 1768 (“just imported from London...some fine visual spectacles, fit for all ages”) and for John Greenhow in the Virginia Gazette of April 11, 1771 (“visual spectacles, of a new construction, by Martin, the celebrated optician”)

The spectacles of Abraham Redwood (1709-1788) still reside in the Redwood Library and Athenaeum in Newport, Rhode Island. Unfortunately, there is no record of when he purchased them or from whom.

A pair of spectacles with tortoiseshell annuli and marked E. Hughes is in the collection of Yale University. These presumably date to the early 1820s. A second pair, marked Deamer, is in the Fairfield (CT) Historical Society. Whether these were actually made by Hughes and Deamer is, of course, speculative. It is possible that old “visual horns” were placed into those marked frames at a later date or that a customer might have wanted old “visuals” in a new frame when Hughes and Deamer were working.
How long were visual glasses available?

The auction of Martin's shop and its contents in 1782 included over 500 pairs of spectacles, half of which were visual glasses. His employee, Gabriel Wright, went to 148 Leadenhall Street to join Henry Gregory; a trade card issued by Gregory & Wright shortly afterwards had a representation of reduced-aperture spectacles in one corner, with the caption "Visual Glasses by G. Wright from Mr. Martin's, Fleet Street".

George Adams, in An Essay on Vision, 1789 commented about visual glasses: "But the good sense of the world, which always, in the long run, justly appreciates the value of every invention, now leaves visual spectacles to the neglect they merit; they are worn by few, but those who, from long habit, have accustomed their eyes to these pernicious shades."

In his 1793 catalogue, J. Bidstrup included "spectacles with visual horns". William and Samuel Jones included "spectacles with Martin's visual horns" at the same price as other spectacles with the same frames in their catalogue of 1793. William Jones had been an apprentice with Martin. Others included David Jones (who ran away from Martin), and Gabriel Wright.

They are seen in portraits painted in 1796, 1805, and 1824, as well as an undated child's riddle book, The Puzzling Cap (probably late 18th century). There are marked European examples from the first quarter of the 19th century, and John Gimesh included a marked pair he dated to the mid-1830s in one of his lists of spectacles for sale. One can only speculate whether these are copies of the Martin style or were produced for some other purpose. There is no primary source information to determine this.

Victorian-era frames with Martin-style margins of horn or, more commonly, tortoise shell can be found. Almost all of these that I have seen have very high plus power lenses that probably were intended for aphakes. I suspect these were devices to reduce peripheral aberrations from these strongly convex lenses, rather than true "visual glasses". Despite their being relatively prevalent in modern collections, I have found no description of them in texts or catalogues of the late 19th century.

"Martin's Margins"

The term "Martin's Martins" is commonly used by collectors but no one seems to know who invented the term or when. Clearly it was not used when visual glasses were actually being used and probably dates back no more than 30 years or so.

Questionably related devices

There are late 18th to early 19th century spectacles that have frosted rims, usually in the shape of a square or diamond. Most of the ones I have seen do have power, usually in the range of 2-4 diopters. I have found no primary references to these lenses nor have I heard a compelling explanation of the purpose of the frosted periphery. Did the frosted area serve a function analogous to the annulus of visual glasses?
Charles Jachan holds an 1839 American patent (#1130) for a similar lens. “The object of my invention is to protect the eye from too strong a light as much as possible, and this I effect by leaving only a small portion of the surface of the glasses polished and surrounding it with a ground space extending to the circumference or outside rim, intended to obstruct the passage of the rays of light and soften their effect upon the eye, leaving that portion opposite the pupil a small clear circular space.”

Summary
Although a modern analysis of Martin’s theory for visual glasses would probably concur with his detractors, he certainly has provided modern collectors with a style that is much desired. It is interesting to note how many specimens have survived 200+ years. Are they so curious in appearance that people have not discarded them? Were they better-constructed than other contemporary spectacles and, therefore, lasted longer? Or, were they very popular, with the opportunity for many to survive?

Acknowledgments
This paper was originally presented at the meeting of the Ocular Heritage Society in Chicago on May 15, 2004.

References
Letters, Corrections, and Clarifications

It is always nice to get communications from OHS members showing that they have been reading Hindsight with a careful eye. Melvin Wolfberg wrote that the January, 2010 issue was "another excellent issue" and he noted two corrections: (1) In the Editor's note preceding Alden Haffner's article on page 17, the date of the OHS meeting should have been November 13, 2009, not February 13, 2009. (2) On page 29, in the review of the book Contact Lenses: The Story, it should be I. William Collins of Pottstown, Pennsylvania, not Pottsdon, Pennsylvania.

Patrick F. Phelan wrote the following concerning Irving Bennett's article, "The Meeting that Changed the Profession," on pages 21-23 of the January, 2010 issue: "I found the article about the LaGuardia meeting to be very interesting, but am confused with the 1968 date. SUNY was founded in 1970, and I entered Mass. College of Optometry in Sept., 1968, and do not recall either Drs. Baldwin or Hazlett being there at the time."

The 1968 date for the LaGuardia meeting is correct. An email from Irving Bennett confirmed that he used the names and affiliations from Milton Eger's article which appeared in the Journal of the American Optometric Association some twenty years after the LaGuardia meeting. Recognizing that time span, it may not be surprising that the affiliations that Eger gave in that article might be a few years off. Dr. Bennett and I agree that we need to keep our history records correct, so I looked up the affiliations of some of the persons mentioned in the article. In case readers are curious about their affiliations in more than just 1968, I will provide some additional details.

Patrick Phelan was correct that William Baldwin was not at Massachusetts College of Optometry at the time of the LaGuardia meeting in 1968. At that time, he was Dean of the College of Optometry at Pacific University. Baldwin earned B.S. and O.D. degrees from Pacific University and M.S. and Ph.D. degrees from Indiana University. Baldwin was Dean of the Pacific University College of Optometry from 1963 to 1969, president of the Massachusetts College of Optometry (named the New England College of Optometry starting in 1976) from 1969 to 1979, and Dean of the University of Houston College of Optometry from 1979 to 1991.

and the Ph.D. in 1975. He served on the faculty of Massachusetts College of Optometry from 1969 to 1972, when he moved to Southern College of Optometry. An email from Sharon Tabachnick, Library Director at Southern College of Optometry, confirmed that Hazlett was on the Southern College of Optometry faculty from 1972 to his retirement in 2003.

Eger listed Alden N. Haffner as Dean of the College of Optometry at the State University of New York (SUNY) at the time of the LaGuardia meeting. Patrick Phelan is correct that the SUNY optometry school had not yet started at the time of the meeting. At that time, Haffner was Executive Director of the Optometric Center of New York, a position which he had held beginning in 1957, and until he took over as head of the optometry school. Haffner earned an A.B. degree from Brooklyn College in 1948, an O.D. from Pennsylvania College of Optometry in 1952, and M.P.A. and Ph.D. degrees from New York University.

It may also be noted that Eger listed Gordon Heath as Dean of the Indiana University School of Optometry, which would also not be quite correct for 1968. Heath was on the faculty at Indiana University from 1955 to his retirement. He became Director of the Division of Optometry in 1970. When the Division of Optometry became the School of Optometry in 1975, he assumed the position of Dean which he held until 1988.

**History of Israeli Optometry**

Issue number 1 in volume 41 of *Optometry and Vision Development*, the journal of the College of Optometrists in Vision Development, contains a short article on the history of Israeli optometry. The authors state that the “first organized group of Optometrists in Israel was founded in 1936 and was called the Association of Dispensing Opticians.” That group was made up mostly of opticians and optometrists trained in Europe and served a social as well as professional role. The Israel Optometric Association was formed in the late 1940s mostly by ophthalmic opticians trained in England and South Africa. Additional optometric groups were formed so that by the late 1950s, there were four with “separate by-laws, concerns and almost no cooperation among them.”

Attempts to pass optometry regulations began in 1979, and in 1991 the first Israeli optometry law was passed. In the 1990s, academic degree programs in optometry were established at Hadassah Academic College in Jerusalem and Bar Ilan University in Ramat Gan. The issue of the journal also contains a two page article on the Hadassah Academic College Department of Optometry and four papers from that department.

**American Academy of Ophthalmology Museum of Vision Website**

In recognition of its 30th anniversary, the Museum of Vision, operated by the Foundation of the American Academy of Ophthalmology, has developed a new website. The URL is www.museumofvision.org. The website has various features including fourteen biographies and eight oral history transcriptions. Among the biographies are a
one paragraph biography of John McAlister and a four paragraph biography of James and George McFatrich, who founded the Murine Eye Remedy Company and operated the Northern Illinois College of Ophthalmology and Otology, one of the predecessor institutions of the Illinois College of Optometry. There are also photos of spectacles, lorgnettes, pince-nez, and other items. Other online sources of photos of spectacles and related items include the American Optometric Association website (http://www.aoa.org/x7388.xml) and the very large display of images at www.antiquespectacles.com.

Swan Burnett, M.D., Ph.D.

Students of optometry history know the story of how threats from an ophthalmologist to prosecute Charles Prentice for practicing medicine without a license for his charging an examination fee led Prentice to launch his crusade for optometry licensure. It might be easy to assume that Prentice’s relationships with ophthalmologists were rocky in general, but in his memoirs Prentice related how he was highly thought of by many medical practitioners. An example he gave was Swan Burnett. Prentice quoted letters he received from Burnett, one of which said “...your own position is just, honest, and liberal, and most excellently put.”

The title page of Burnett’s 1904 book *The Principles of Refraction in the Human Eye Based on the Laws of Conjugate Foci* includes the notation “Illustrated with 25 Original Diagrams by Chas. F. Prentice, M.E.” In the last paragraph of the author’s preface, Burnett says: “For valued assistance in the construction of the diagrams, all of which are original, which illustrate the text of this work, I wish to acknowledge my indebtedness to the well-known scientific and technical skill of Mr. C.F. Prentice, M.E., of New York.”

So when an article about Burnett recently appeared in the *Archives of Ophthalmology*, I was curious to see what I could find out about him. Albert and Atzen wrote that Burnett was born on March 16, 1847. Burnett’s father was a general medical practitioner in Tennessee, and his first medical studies were with his father. He also studied at the Miami Medical College of Cincinnati and at Bellevue Hospital Medical College in New York. Through parts of the late 1860s and early 1870s, Burnett practiced general medicine in Tennessee.

In 1873, Burnett married Frances Hodgson, who would go on to great fame as author of *The Secret Garden* and *Little Lord Fauntleroy*, the latter serialized in a periodical in 1885 and published as a book in 1886. By 1875, Burnett’s wife had achieved sufficient financial success from her writing that they could go to Europe for a year, where Burnett studied with leading eye specialists. A significant portion of the article by Albert and Atzen deals with Burnett’s marriage and family life. His first marriage was not a happy one and eventually ended in divorce. Burnett later remarried two years before his death.

Burnett practiced in Washington, D.C., starting in 1876, initially specializing in ophthalmology and otology, and later in ophthalmology only. In 1889, Burnett received an appointment as a professor of ophthalmology and otology at Georgetown University, and in 1890, he was awarded an honorary doctor of philosophy degree from
Georgetown. The authors say that Burnett “wrote well and enjoyed intellectual pursuits.” Burnett completed translations of French and German medical works, including a translation of Landolt’s *A Manual of Examination of the Eyes* (1879). In addition to the previously mentioned book, Burnett published a textbook entitled *A Theoretical and Practical Treatise on Astigmatism* (1887).

Burnett’s publications were primarily in the areas of refraction, color blindness, the relation of race to disease, and the use of ophthalmoscopy. In their discussion of his publications on refraction, the authors state that: “In 1890 he presented a mathematical model, worked out at his request by Charles F. Prentice of New York, New York, to demonstrate the mathematical basis of refraction by crossed cylinders” and they cite a reference.11

Burnett was a book and art collector, and as an amateur anthropologist, he published articles in the *American Anthropologist* journal. Albert and Atzen described Burnett as having “devotion to his profession and to the poor and needy patients of Washington, D.C.”, and as being “a skillful surgeon…”, “an excellent teacher…”, and “a proud and loving father…”.10 Burnett died on January 18, 1906, at the age of 58 years.

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1. Eger MJ. Now it can and should be told. J Am Optom Assoc 1989;60:323-326.
Book Review: The First Century: Oklahoma Association of Optometric Physicians


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This book was produced to celebrate the one hundredth anniversary of Oklahoma's state optometric association. Like most state optometric associations, Oklahoma's has gone through various name changes, starting in 1906 as the Oklahoma State Optical Society. In 1912, it became the Oklahoma Association Optometrists, and in 1946, the Oklahoma Optometric Association. In 1997, it became the Oklahoma Association of Optometric Physicians (OAOP).

Pages 1 to 21 contain introductory material, lists of past presidents and award winners, and text of a speech honoring various contributors to Oklahoma optometry. The speech was given by Mack Smith, a long-time member of the Oklahoma Board of Examiners in Optometry and an early developer of the Vision Education Foundation co-management referral center. Page 22 lists key legislation, and page 23 exhibits the code of ethics adopted in 1923 and revised in 1935.

Pages 25 to 55 present a historical account of the association, with pages 25 to 35 being on the first fifty years. The narrative on the first fifty years was written by Martin A. Yourman, who graduated from optometry school in 1931 and passed away in 1989. The history of the second fifty years was written by Oliver L. Pettry III, who has worked for the Oklahoma association. Most of the history was based on interviews.

A.Y. Boswell of Tulsa was the first association president and C.O. Lynch was the first secretary elected in 1906. A significant portion of the history section of the book is devoted to legislative efforts. Oklahoma has often been one of the first states to pass legislation expanding optometric scope of practice. Other legislative efforts included work toward parity with Medicare and other agencies. Two long-time Executive Directors of the association, LeRoy Oxford, from 1955 to 1988, and Saundra Gragg Naifeh, from 1988 to the writing of the book, were highlighted for their contributions. In 1989, George Foster became the first Oklahoman to be named American Optometric Association Optometrist of the Year. Dawn Holstead Upshaw became the first woman to serve as president of the Oklahoma association in 1998.

Pages 57 to 69 are a section of one to two page contributions by twelve Oklahoma luminaries highlighting various achievements and strengths of Oklahoma optometry. The most informative of these contributions was "NSU-OCO's [Northeastern

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State University Oklahoma College of Optometry] influence on OAOP, by George Foster, long-time Oklahoma practitioner and Dean of the College of Optometry at the time this book was written. This entry covers the efforts to start the school and the positive influence of the school on optometry in Oklahoma. The school enrolled its first students in 1979, and by 2006, a total of 301 of the 585 optometrists licensed in Oklahoma were graduates of NSU. I did find one minor error on page 61 when it was stated that the educational program at NSU moved from former dormitory Wyly Hall to the former W.W. Hastings Indian Health Service Hospital in 1982. That move to the renovated former hospital building (that continues to house the school at present) occurred in January of 1991.

An interesting fact discovered on page 65 is that Greg Clay, who was president of the Oklahoma association in 1986, is one of seventeen eye doctors in his extended family, ten being from Oklahoma. I wonder if that could be a record! Three members of his family were presidents of the Association and three others served on its Board of Directors.

Pages 71 to 81 are a picture section. Pages 83 to 92 contain pictures, notes, and reproductions of posters relating to the association’s centennial celebration. There are many other color as well as black and white photographs throughout the book. Having served on the faculty at Northeastern State University from 1980 to 1992, I enjoyed seeing pictures of former students and learning more about optometry in Oklahoma. The book does a good job of demonstrating the pride Oklahoma optometrists have in the optometric profession in their state.
Book Review: Johannes Kepler and the New Astronomy


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Johannes Kepler (1571-1630) is one of the most interesting figures in the history of science. He is famous for his writings on astronomy and his three laws of planetary motion, but he also published two books on optics, delineating many of the basic principles of geometrical optics and for the first time, giving a correct description of image formation on the retina. He achieved much despite having a father who left home early, having to move frequently to avoid the religious conflict that culminated in the Thirty Years War, and having his first wife and several of his children die. He was profoundly religious, as illustrated by a statement in one of his letters to a former teacher when he said, “see how, God is also glorified in astronomy through my work.” (page 32)

This 141 page book was written for high schoolers and older as part of the Oxford Portraits in Science series of biographies of important persons in the history of science. The author holds a Ph.D. in the history of science and has taught astronomy and history of science at Williams College, Harvard University, and the Johns Hopkins University. The book provides a clearly written compact summary of Kepler’s life and work. The discussion of Kepler’s work naturally emphasizes astronomy, but his work in optics is also mentioned.

In 1604, Kepler published his first book on optics. An English translation from Latin of the title is Supplements to Witelo, in which the Optical Part of Astronomy is Treated. It is among the 450 pages of this book that Kepler described optical imagery within the eye. According to Voelkel, this book “became the foundation work of seventeenth century optical theory.” (page 61) In 1611, Kepler published his second book on optics, Dioptrice. This book contained “the first detailed optical theory of two lens systems..., including a superior telescope design using two convex lenses, now called the ‘astronomical’ or ‘Keplerian’ telescope.” (page 70)

The book includes numerous black and white illustrations, a three page chronology of Kepler’s life, a two page bibliography, and a three page index. It is recommended as an introduction to the life and work of Johannes Kepler.
Instructions to Authors

Hindsight: Journal of Optometry History is the official publication of the Optometric Historical Society (OHS), and, as such, supports and complements the purposes and functions of OHS. The journal publishes historical research, articles, reports, book reviews, letters to the editor, and article reviews. The topics of material published in the journal include: history of optometry; history of eye and vision care; history of spectacles, contact lenses, and other corrective devices; history of vision therapy, low vision care, and other vision care modalities; history of vision science; biographical sketches of persons who have worked in or influenced optometry and/or vision science; recollections or oral histories of optometrists and persons who have worked in optometry and optometry-related fields; and related topics.

Material submitted for publication should be sent to the editor: David A. Goss, School of Optometry, Indiana University, Bloomington, IN 47405; dgoss@indiana.edu. Material may be submitted by postal service or by email, although the preferred mode of reception of submissions is a Word document in an email attachment.

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Submissions should include a title, the names, degrees, postal addresses, and email addresses of the authors. Abstracts are not recommended for short articles. Abstracts and key words are recommended but not necessary for longer articles.

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Extensive use of uncommon abbreviations, symbols, and acronyms is discouraged. Common abbreviations, such as D for diopters or cm for centimeters, may be used. Common symbols, such as Δ for prism diopters, may be used when the context for their use is clear. The first use of acronyms should be accompanied by the name or phrase spelled out followed by the acronym in parentheses, as for example: The Optometric Historical Society (OHS) has produced a quarterly publication since 1970.

Acknowledgments should be placed between the text of the article and the reference section. Sources of support, such as grant funding or other significant assistance, should be acknowledged. The assistance of persons who contributed to the work may also be acknowledged.

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