

HINDSIGHT

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Welcome Jay Enoch:

Long-time OHS member Jay Enoch has taken on double duty with the OHS. He was elected by the OHS Board to fill the remainder of Jack Bennett's term on the Board (in accordance with the Society's bylaws: "Vacancies of unexpired terms shall be filled by the election of a replacement by a majority of the remaining members of the Executive Board."). He has also agreed to become a contributing editor for the newsletter and contribute a regular column. His first such column follows.

Seeking Sources of Our Heritage in Optics, Optometry, and Vision Science, by Jay M. Enoch:

Dr. Walter Chase kindly invited me to write a regular column on issues of interest to the readers of *Hindsight*. As my first contribution, I have chosen to report some studies by myself and related work of others participating at a meeting of the Renaissance Society of America in Florence (Firenze), Italy, in March, 2000, at the Palazzo Strozzi. The papers presented in our three man mini-symposium in Firenze will be reported in the Italian journal, *Atti della Fondazione Giorgio Ronchi*. The three participants were Professor Vincent Ilardi of the University of Massachusetts - (who has argued for some time that spectacles originated in Firenze), the writer, and Professor A. Mark Smith, of the University of Missouri, Columbia.

My wife and I stayed at the Hotel Minerva, which is just a door or two away from St. Maria Novella Church, where on February 23, 1306, Dominican preacher Giordano Da Pisa declared to his audience (a first statement), "It is not twenty years since they discovered the art of making glasses which help you see well, that is one of the best and most necessary skills in the world, and it is only a short while that it has been discovered, a new skill which never existed before, and I saw the man who first invented and made them." (This quotation is taken from Robert Gibbs, see reference below)

Professor Vincent Ilardi, in the course of his studies of early Florentine lenses came across a number of references to use of concave mirror devices for visual corrections of refraction, near vision correction, and as magnifiers. He provided me with the references, and asked me to try to explain how the mirror systems might have worked. Frankly, I had never heard of concave mirror visual corrections employed for these purposes. We are all familiar with bathroom shaving and make-up mirrors and the left-right reversals associated with them.

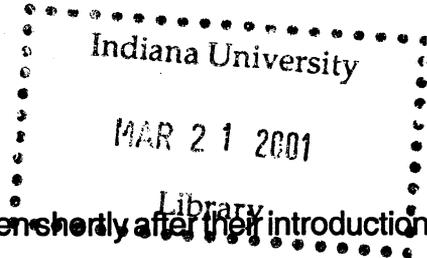
In fact, it turns out that dual mirrors were used to achieve the necessary left-right and axial reversals encountered. These were either a concave mirror and a plane mirror or two concave mirrors. Amazingly these devices may have been in use from at least Roman times until well after the introduction of spectacle lenses. This is a period of time well over a millennium! Hence, (with further verification) we must consider these mirror devices a part of our ophthalmic heritage.

The first clear mention of mirror systems is included in the works of Seneca, the Younger, who lived in Rome at roughly the time of Christ. He cites the broad use of mirrors for magnifiers and purposes of visual enhancement. He alludes to the double mirror systems used by a man called H. Quadra to add further excitement to his displays of (kindly put) X-rated theatrical debauchery! Of such history is made! I have tried it; the mirrors, not the debauchery exhibitions, and it works! The next reliable reference is to Giovanni Baptistae della Porta who describes a concave mirror plus plane mirror system which was apparently in common use at a time somewhat after the introduction of spectacles. This too works. Albertotti, writing at the end of the 19th century, also describes concave mirror systems similar to those described by della Porta - in fact he advocates their use.

Robert Gibbs, in his excellent book on Tommaso da Modena (Tommaso painted the first representation of spectacles in a fresco in the St. Nicolo Chapter House in Treviso, Italy - located north of Venice) also displays/speaks of two different forms of mirror correction/magnifiers, and one of his subjects is shown using a magnifying glass. These frescos were painted in 1351-1352, which was just after the end of the black death plague in Europe, and 65-70 years after the introduction of spectacle corrections. These several references are provided below.

In discussion at lunch with Professor A. Mark Smith, he pointed out that one could use a simple highly polished concave bowl of a spoon as an effective magnifier without the usual left-right image inversion. Optically, this works differently from the Seneca (and Quadra), della Porta, and Albertotti arrangements (detailed in my paper). The experiment was conducted within minutes of the discussion, and indeed Smith's spoon device does work! Were spoons finished with sufficient polish and smoothness in early times, were other concave mirrors used in a similar manner? There is no documentary evidence of this to my knowledge, but that does not mean the approach was not utilized. At this point in time, there are many questions, but these mirror systems all do work, apparently a number were used, and they need to be studied further. A fascinating set of findings. Amazing, perhaps a millennium of use!

Also at this meeting, Ilardi presented a most interesting discussion of early spectacle economic issues, as well as an interesting analysis of the rapid increase in their utilization and distribution. He demonstrated (and I have long suspected) that there was employed a simple means of grading these spectacle lenses by power. A lack of a system of power grading would have greatly limited spectacle lens manufacture and distribution and increased



meaningfully the remarkable low price of these items - even shortly after their introduction into the market.

References:

1. Lucius Annaeus Seneca (circa 4 B.C. - 65 A.D.): Title of 10 volume book set: *Seneca with translation and notes by Thomas H. Corcoran* [see Volume VII of Corcoran which contains Volume I of *Naturales Quaestiones* by Seneca; also see Note 2 of the translation by Corcoran. London and Cambridge, MA: W. Heinemann and Harvard University Press, 1971-72. Volume 7, Introductory material + pp. 1-297. The Latin text accompanies the English translation. This set is available at University of California Berkeley, Loeb Classical Library and in the Main Stacks #PA6156.S4 1971].
2. Giovanni Baptistae (della) Porta (1536-1615): *Magiae Naturalis* (Natural Magic). {The author owns a 1651 post-mortum Latin edition of this book. Book 17, *Die Catodiotricis*, Chapter 5. This material appears on page 586 in the author's copy.} English translation (probably from another edition) by Derick J. Price, New York, Basic Books, 1957. Of strange glasses (same material) page 363. There is also a discussion by Boring, page 257, and an English translation dated 1658 of Chapter 17 (see Bernard Becker Library, Washington University Medical School, St. Louis, MO).
3. Giuseppe Albertotti: *Lettera intorno alla inventzione degli occhiali all'Onorevmo Senatore Isodoro Del Lungo*. In: *Occasione del VII Centario della R. Universita di Padova*. Roma, *Tipographia delle Scienze*, 1922, 24 pages; pages 10-11; items number 22-23 address the issue of use of mirrors for refractive corrections.
4. Rogert Gibbs: *Tommaso da Modena: Painting in Emilia and the March of Treviso, 1340-1380*. Cambridge, NY: Cambridge University Press, 1989. A fine source book on Tommaso and his work, as well as the optical issues at hand (mirrors, magnifiers, spectacles).
5. Vincent Ilardi: The role of Florence in the development and commerce of spectacles. *Atti della Fondazione Giorgi Ronchi* (in press).
6. Jay M. Enoch: Concave mirrors used for visual corrections during the Renaissance and earlier. *Atti della Fondazione Giorgi Ronchi* (in press).

Book Review: Eyeglass Retrospective:

Eyeglass Retrospective - Where Fashion Meets Science, by Nancy N. Schiffer, Atglen, PA: Schiffer Publishing Ltd., 2000, 190 pages plus 2 page index, hard cover, \$39.95, ISBN 0764310410.

This book is a picture book of glasses through the years, with about 600 color photographs. Each photograph has an accompanying description of markings on the

spectacle frames along with other information. Text entries interspersed through the book discuss various trends in spectacle making, patents, and the like. The dust jacket describes the author Nancy Schiffer as being "fascinated with objects that reflect their cultural background. Her focus on eyewear here follows previous studies of popular arts, including furniture, ceramics, and jewelry."

The book is organized into four main sections: Earliest Eyewear (10 pages), 18th Century (10 pages), 19th Century (42 pages), and 20th Century (122 pages). The earliest eyewear section features pictures of Nuremberg magnifiers, leather frames, and 17th and 18th century Chinese frames. In the 18th century portion of the book there are pictures of frames with the first use of temples, and of "scissors" glasses.

In the 19th century section there are many kinds of glasses shown, including frames with folding temples, sliding temple frames, monocles, tortoiseshell and horn frames, wire frames, lorgnettes, pince-nez glasses, etc. This section of the book also has 11 pages on the McAllister optician family. The book identifies the working dates and addresses of McAllister opticians in Philadelphia (1799 to sometime after 1905), New York City (1863-1900), and Baltimore (1878-1971). Shown are McAllister frames, eyeglass cases marked McAllister, advertising materials, markings on silver frames, and a photograph of the front of their shop in Philadelphia in 1843.

The section on the 20th century starts with pince-nez glasses, folding eyewear, and other early 20th century glasses and then proceeds through the decades to the late 1990s. Most of the photographs for the late 20th century are of novelty frames. Some of the pictures are of celebrities or models in unusual eyewear.

Photography in the book is excellent. Most of the items photographed were from private collectors, from the American Academy of Ophthalmology Museum of Ophthalmology in San Francisco, and from Oliver Goldsmith Eyewear Ltd. Looking at pictures of older eyewear was interesting, and the photographs of novelty eyewear were entertaining.

The book can be purchased from the publisher for \$39.95 plus \$3.95 for shipping. The publisher's address is: Schiffer Publishing Ltd., 4880 Lower Valley Road, Atglen, PA 19310 U.S.A. Contact with the publisher can also be made by phone (610-593-1777), fax (610-593-2002), or email (schifferbk@aol.com). A website catalog is available at www.schifferbooks.com.

D.A.G.

Papers from the other O.H.S.:

The Ocular Heritage Society had its 2000 annual meeting in Washington, D.C., and Alexandria, Virginia, on April 6-8. Six manuscripts of talks given on April 8, 2000, were distributed to the organization's membership.

"Spectacles on Ceramics" was the topic of a paper by J. William Rosenthal, M.D., D.Sc. He talked about ceramics dating from about the mid 18th century to the late 20th century, some from his own collection. He concluded that "Ceramic figures wearing spectacles are not frequently found. They may be old or new, cheap or expensive, ordinary or educational. They all add spice to a collection that could otherwise be dull."

Alan McBrayer wrote about "Researching the American Spectacle Maker and Dealer - Sources and Methods." He gave a progress report on his research project identifying American spectacle makers in the 18th and 19th centuries. He has used city directories, newspapers, census records, patent records, advertising materials, articles in mechanics and arts journals, books, local histories, and watch papers. Watch papers are circular papers placed in watch cases identifying the seller and repairman. Books specifically mentioned by McBrayer were "Silver and Gold Spectacles of the Nineteenth Century," by Jerome Redfeam, and "Spectacles and Other Vision Aids," by William Rosenthal. He also mentioned the value of using the internet to search catalogs of libraries or other catalogs such as the Research Libraries Information Network. McBrayer has been able to identify some spectacle makers from markings on spectacle frames. Lastly he wrote that he would appreciate help from collectors and others: "I would greatly appreciate from each of you a listing of markings that may be on silver or gold spectacles in your collections. Also, copies of early advertisements or broadsides would be very helpful, as would any primary source information dating prior to 1870. I am always available to you to answer questions or help with identification of maker marks - you can contact me at my office (704-336-2503), my home (704-525-4525), or by email (mcbraar@aol.com)."

Katherine Ott, Ph.D., Curator of Division of Science, Medicine, and Society at the National Museum of American History, Smithsonian Institution, gave a paper entitled, "Winkin', Blinkin', and Nod: The Recent History of Artificial Eyes." She credited Ambroise Pare, in 1579, with being one of the first persons to make an artificial eye. This artificial eye consisted of a metal plate covered with chamois which had eye, lid, and lashes painted on it. This was held over the lid by a cord or bar that wrapped around the head. Venice led the artificial eye market in the 18th century. The first enamel artificial eye was made in about 1822 by the Boissonneau family of Paris.

The manufacture of prosthetic eyes was led by Germany in the 1879s and 1880s. There a double-walled eye, less prone to breakage, was developed. In the first part of the 20th century, most artificial eyes were glass eyes made in Germany. The first acrylic eye was made by three American dentists in 1942, one of whom was named Milton Wirtz. They used

common denture-making materials and processes to make prosthetic eyes from a wax eye socket cast made by the ocularist.

A paper entitled "Dating of Spectacles by Daguerreotypes," was given by John W. Tull, M.D. Daguerreotypes are photographs produced on silver coated copper plates. Daguerreotypes are named for Louis Daguerre, who, in 1839, announced his discovery of a fixative process for the preservation of photographic images. The daguerreotype process produced high resolution photographs, but was quite laborious. Other photographic methods had largely replaced it by about 1860. The most important method of dating daguerreotypes is by identifying the mat style in daguerreotype cases. Tull used this to date spectacles in daguerreotype images.

"How to Write a Book," by Nancy Schiffer, briefly overviews some recommendations for potential authors on preparing a manuscript and working with a publisher. Schiffer is both an author and a publisher. Her book, "Eyeglass Retrospective - Where Fashion Meets Science," is reviewed in this issue of *Hindsight*.

Jay M. Galst, M.D, wrote about "George Washington's Optician - The First United States Mint Director," David Rittenhouse (1732-1796). Rittenhouse was a leading 18th century American scientist and patriot, but he was overshadowed by Benjamin Franklin. Before becoming the U.S. Mint Director late in life, Rittenhouse had been a clockmaker, surveyor, mathematician, and astronomer. About 40 of the clocks he made still exist.

After Rittenhouse received a copy of Newton's *Opticks* as a gift, he built the first telescope and observatory in America in 1756. He also made a mechanical model of the solar system, made observations of Venus and a solar eclipse, discovered a comet, and developed the use of natural spider webbing for a reticle cross-hair system in telescope transits and other position measuring instruments. He was a professor of astronomy at the University of Pennsylvania.

Rittenhouse was a member of the 1776 Pennsylvania Constitutional Convention, and was Pennsylvania state treasurer from 1777 to 1789. He served as an engineer during the American Revolution. Among his duties was supervising the casting of cannon and the manufacture of saltpeter, an ingredient in gunpowder. Rittenhouse was a member of the American Philosophical Society from 1786 to his death, serving at various times as its curator, librarian, secretary, vice president, and president.

In 1783, Rittenhouse fabricated spectacles and reading glasses for George Washington. In a letter of thanks to Rittenhouse dated February 16, 1783, Washington stated,

"I have been honoured with your letter of the 7th, and beg you to accept my sincere thanks, for the favor conferred on me, in the Glasses - which are very fine; but more particularly, for the flattering expressions which accompanied the present.

"The Spectacles suit my eyes extremely well - as I am persuaded the Reading Glasses also will, when I get more accustomed to the use of them. At present, I find some difficulty in coming at the proper focus; but when I obtain it, they magnify perfectly, and shew those letters very distinctly, which at first appear like a mist - blended together and confused. With Great esteem and respect, I am, Sir, your most obedient and humble servant,
 "Go. Washington"

Galst cites five books as references, two of them on coins and three biographies/memoirs of Rittenhouse.

D.A.G.

Optometric history websites:

If one runs an internet search on optometric history, there are only a few sites identified that deal extensively with the history of optometry. Occasionally I will, in upcoming issues of *Hindsight*, mention some sites that may be of interest to readers.

A site that caught my attention recently was one that gave a brief history of a four generation optometry practice in New Zealand (<http://homepages.ihug.co.nz/~Spsdick//home2.htm>). The following is the text of the history of that practice: "Peter George Dick qualified as an Optician in London in 1915 and opened a combined jewellery and optical business in Princes St., Dunedin, NZ. In 1930 his son Peter Norman Dick took over the practice once he qualified and built up the optometry side of the business. In 1962 his son Peter Leslie Dick joined him and together they expanded the optometry practice and eventually sold the jewellery business to the Daniels. Both Peter N and Peter L visited many parts of Otago on a regular basis. Peter Norman retired in 1979 and died in 1994. In 1992 Peter Stewart Dick joined his father and they opened the Oamaru practice in combination with the Dunedin practice. Some patients have managed to see all four generations of the Peter Dicks!" The site also contains photographs and brief biographies of Peter L. and Peter S. Dick, a photograph of the front of the office in 1917, and what appears to be a newspaper advertisement for Peter G. Dick in 1921.

Another website of interest is "Important Dates in Vision Science" (http://aris.ss.uci.edu/cogsci/vision/yellot_dates.htm). It appears to have been compiled by Jack Yellot (jyellot@aris.ss.uci.edu) of the University of California Irvine. The following vision scientists are acknowledged for their contributions to the list: Jim Bellingham, Institute of Ophthalmology, London; Ted Cohn, University of California Berkeley; Hans Irtel, University of Mannheim; Bela Julesz, Rutgers; Dan Kersten, University of Minnesota; Leonard Trejo, University of Illinois at Urbana-Champaign; and Frans Verstraten, McGill.

The site is a listing of 133 significant vision research events occurring between 1600 and 1960. The author hopes that "such a list can be helpful in gaining a quick historical

perspective,” and states that “the object here is not to contribute anything new to the history of vision research but rather simply to collate material already scattered throughout the literature...” Twenty-three references are given.

The first few events in the chronological list are as follows:

1604: Kepler’s *Ad Vitellionem Paralipomena*: First explanation of the optics of the eye.

1610: Galileo publishes the *Siderial Messenger*. First scientific look at the sky through a telescope.

1611: Kepler’s *Dioptrice*: First explanation of the optics of myopia. Projection theory of stereoscopic vision.

1619: Scheiner’s *Oculus*: First demonstration that accommodation is an active process. First use of fixatives to preserve the eye for anatomical study. First accurate diagram of the human eye. Discovery of the pupillary “near reflex.”

1621: Snell’s law. (Kepler’s optical analysis of the eye was based on a small angle, linear approximation to Snell’s law).

1625: Scheiner: First direct observation of the retinal image.

1637: Descartes’ *La Dioptrique*. Corpuscular theory of light. First suggestion of point to point projection of retina onto brain (in his view, onto the walls of the ventricles).

1664: Willis traces the optic nerve to the thalamus.

1665: Grimaldi describes diffraction (posthumously).

1666: Newton’s prism experiments begin color science.

1675: Roemer measures the speed of light.

D.A.G.

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