

## History of Optometry

David A. Goss, O.D., Ph.D.

Lecture Handout

Lectures in V578, Public Health Policy and the Optometric Profession

November 18 and 20, 2003

Why should optometrists know about their history?

1. Optometry is, and always has been, a unique and important profession.
  2. Optometry has a lot to be proud of.
  3. We should learn from the past. Those who don't know history will repeat past mistakes.
  4. We should have respect for those who have contributed to our profession.
- 

Some topics on the history of optometry:

1. What are the origins of optometric science?
  - a. optics
  - b. image formation by the eye
  - c. sensory physiology
2. When were the first spectacles made?
3. When did optometry begin?
4. When were the first optometry books published?
5. How does optometry differ from medicine?
6. How did optometry develop in the United States?
7. When were the first American optometry licensure laws passed?
8. What were optometrists called before they were called optometrists?
9. When was the American Optometric Association formed and what was it originally called?
10. When did the existing American Optometry schools start, and where was the first American university affiliated optometry school?
11. What school awarded the first O.D. degree, and what schools were the last to adopt the O.D. as the professional optometry degree?
12. What was the initial stimulus for optometry to start studying ocular disease, and when were the first optometry diagnostic and therapeutic pharmaceutical agent laws passed?
13. What were oculists and what lesson does the history of oculists and ophthalmologists provide for optometry today?
14. What are some major optometric organizations and when did they begin?
15. When and how did the optometry school at I.U. begin?

History of Optometry lectures; David A. Goss, O.D., Ph.D.

Learning history is more about learning from the past to guide us for the future, taking pride in those that have come before us, and placing what we do in its proper context, than it is about memorizing names and dates. So the list of names below is meant as a spelling guide rather than a list of names to be memorized:

Aristophanes	Euclid	Claudius Ptolemy
Johannes Kepler	Sir Isaac Newton	Snell
Monoyer	Empedocles	Leucippus
Democritus	Aristotle	Alhazen
Thomas Young	George Biddell Airy	Goodrich
John McAllister, Sr.	Christoph Scheiner	Aguillon
William Porterfield	Johannes Purkinje	Charles Wheatstone
Hermann von Helmholtz	Roger Bacon	Rivalto
Benito Daza de Valdes	William Molyneux	Peter Brown
John McAllister, Jr.	James W. Queen	Benjamin Pike
James Prentice	Charles Prentice	Thomas Hall Shastid
James Cook McAllister	William Young McAllister	John P. Davey
Irvin Borish	Virgil McCleary	Hermann Wells
Hermann Briscoe	Henry W Hofstetter	Merrill Allen
Gordon G. Heath	Jack W. Bennett	

---

An Invitation:

One way to celebrate the unique and fascinating history of optometry is join the Optometric Historical Society. OHS publishes a quarterly newsletter filled with tidbits and information about optometry's heritage and history. Annual membership dues are \$10. Sample copies of the newsletter are available on my office door (room 530) and on the OHS website (see URL below). To join send your name, address, and a check for \$10 made out to the Optometric Historical Society, to:

Bridget Kowalczyk  
OHS Secretary-Treasurer  
International Library, Archives, and Museum of Optometry  
243 North Lindbergh Boulevard  
St. Louis, MO 63141

Optometric Historical Society website: [www.opt.indiana.edu/hndsight/index.htm](http://www.opt.indiana.edu/hndsight/index.htm)

History of Optometry  
David A. Goss, O.D., Ph.D.  
Lecture Notes  
Lectures in V578, Public Health Policy and the Optometric Profession  
November 18 and 20, 2003

## **1. What are the origins of optometric science?**

### **a. Optics**

There is evidence that lenses for decoration existed a few thousand years BC.

The ancient Greek author Aristophanes wrote in 434 BC about a burning glass.

The Greek mathematician Euclid in about 280 BC wrote about light traveling in straight lines and the equality of the angles of incidence and reflection. He also talked about the concept of the visual cone which is the equivalent of our concept of visual angle today.

Claudius Ptolemy in about 150 AD measured angles of incidence and reflection from air to water but did not discover the exact mathematical relation.

Johannes Kepler (1571-1630) - In Kepler's 1611 book *Dioptrics* there are descriptions of the mathematics of lenses, prisms, and mirrors. Kepler presented many of the concepts taught today in geometric optics.

Sir Isaac Newton showed how white light could be split into component colors and then recombined into white light.

Snell discovered the law of refraction in 1621. Snell died at 35 years of age, and his contribution was not widely recognized until after his death.

Inventor of the term diopter - Monoyer, 1872.

### **b. Image formation by the eye**

Empedocles (c. 450 BC) - extramission theory, visual ray.

Leucippus, Democritus (5<sup>th</sup> century BC) - intromission theory, eidola.

Aristotle (4<sup>th</sup> century BC) - mediumistic theory

Alhazen (965-c.1041 AD) - proved intromission

Johannes Kepler - first accurate description of image formation on the retina

Thomas Young (1773-1829) - first to measure astigmatism (1801)

George Biddell Airy - English astronomer credited with being the first to design and wear a spherocylindrical lens to correct astigmatism (published 1827). An optician

named Fuller made the lenses. At about the same time the McAllister family of opticians in Philadelphia made a cylinder lens for a Rev. Goodrich. Goodrich obtained minus lenses, but as he explained in a letter to the McAllisters, vertical lines appeared clearer without his glasses and horizontal lines appeared clearer with his glasses. Based on their correspondences, the McAllisters made a planoconcave cylindrical lens which Goodrich started wearing in May of 1828.

### **c. Sensory physiology**

Visual illusions were discussed by the ancient Greeks.

Christoph Scheiner (1611) described several observations about the eye, including the size of images reflected from the cornea. His double aperture principle is used in most present-day autorefractors.

The mathematician Aguillon published one of the first significant analyses of binocular vision in 1613.

William Porterfield made an optometer in the mid 1700s and noted the existence of a relationship of accommodation and convergence.

Thomas Young - trichromatic theory of color vision and crystalline lens as source of accommodation

Johannes Purkinje, Czech physiologist, published books on sensory physiology in 1823 and 1826. His name is attached to many phenomena - Purkinje images, Purkinje tree, etc.

Charles Wheatstone invented the mirror stereoscope and in 1838 used it to experiment on binocular vision and stereopsis.

Hermann von Helmholtz (1821-1894), physiologist and physicist, wrote *A Handbook of Physiological Optics*.

According to Hofstetter, the background sciences for early optometry were stronger than for any other profession.

Optometry has incorporated knowledge of optics, mathematics, psychology, and other sciences. And optometry has developed its own literature in clinical practice and vision science. Optometry has been the leader in investigations on clinical lens application, non-strabismic binocular vision problems, contact lenses, low vision, role of vision in learning, etc.

## **2. When were the first spectacles made?**

The exact origin and inventor of spectacles are unknown.

Roger Bacon in the middle 13<sup>th</sup> century talked about placing a planoconvex lens on text for magnification.

Spectacles probably originated in the late 13<sup>th</sup> century in Italy. In a manuscript from 1305 AD, a monk from Pisa named Rivalto wrote, "It is not yet 20 years since there was discovered the art of making eyeglasses."

Most likely, the first person to make spectacles was an unknown artisan, who tried to keep his methods secret to avoid economic competition. By 1300 AD, there were spectacle manufacturing businesses in Italy, Germany, and the Netherlands. Some of the first spectacle frames were made from leather and wood.

### **3. When did optometry begin?**

MYTH – Optometry began about 100 years ago when the first optometry licensure laws were passed in the US.

Another extreme viewpoint - Chester Pheiffer suggested that optometry began with the pronouncement "Let there be light." (Genesis 1:3)

A reasonable time of origin for optometry is when spectacles appeared. Conventional wisdoms for use of spectacles developed after the advent of spectacles.

### **4. When were the first optometry books published?**

In 1623 Benito Daza de Valdes published a book which covered optics, ocular anatomy, and the use and fitting of spectacles. He included a system of lens grades for lens power, and he resented a table of lens grades according to age in presbyopia. He suggested that minus lenses for myopia should not be so powerful as to cause perceived reduction in image size. Daza de Valdes also included case reports.

William Molyneux published an optometry book in Ireland in 1692. He suggested uses the weakest lens that solves the problem and he discussed the occasional nearpoint problems of myopes when they get new glasses.

### **5. How is optometry different from medicine?**

#### **a. legally**

Legal cases in the first half of the 20<sup>th</sup> century ruled that optometry was separate from medicine.

#### **b. origins**

Their origins differ both in the sciences from which they developed and in the shift of tradesmen into the professions.

scientific origins: optometry – optical sciences, medicine – biological sciences  
tradesmen who entered the respective professions: optometry – jewelers (they had the tools to work on spectacles), medicine – barbers (they had the equipment with which early surgeries could be done)

### **c. areas of primary expertise**

optometry – optics, refraction, vision science, non-strabismic binocular vision and accommodative problems

medicine – surgery, anatomy and physiology, pharmacology, disease

## **6. How did optometry develop in the United States?**

It is said that Peter Brown, a Pilgrim, brought a pair of eyeglasses to North America in 1620 and thus became the first to wear glasses on this continent. There is little known about the use of spectacles in North America for more than another hundred years. During this period of time spectacles were obtained ready made from Europe. Spectacles were uncommon and expensive.

The year 1783, when John McAllister, Sr., a Philadelphia whip and cane maker, purchased a number of spectacles, is often considered the beginning of the American optical industry. Soon he was making spectacles. In 1811, his son, John McAllister, Jr., joined him in business. The McAllister family of opticians continued in business until the early 1900s.

Because there were few places to get glasses, there was no demand for vision testing. So spectaclemakers became the first refractionists. The McAllister family taught refraction and the optical business to many people, notable among them James W. Queen, who started his own business in 1853.

Other notable early American optometrists were Benjamin Pike, who came to the US in the early 1800s, and James Prentice, who came to the US in 1847. They both were trained in optics in England, and they both trained their sons. James' son, Charles Prentice, would have an important role in the development of American optometry.

Gradually two types of persons providing spectacles could be discerned: dispensing opticians and refracting opticians. The refracting opticians were essentially optometrists, because they were doing vision testing and writing lens prescriptions.

## **7. When were the first American optometry licensure laws passed?**

The first attempt was in 1897 in New York. This effort was a consequence of threats to Charles Prentice from ophthalmologists for charging a fee for a vision examination. The first law was passed in 1901 in Minnesota. All states and the District of Columbia had optometry licensure laws by 1924.

In comparison, the first medical licensure law in the US was passed in the late 1700s, but it was 1895 before almost every state had its own medical licensure board. The first state dental licensure law was passed in 1868 and all states had dental licensure laws by 1900.

## **8. What were optometrists called before they were called optometrists?**

First use of the term optometrists is thought to have been by Landolt in 1886 to describe the fitting of glasses. The term became popular in the first two decades of the 20<sup>th</sup> century. Before then optometrists were usually referred to as opticians.

In the 19<sup>th</sup> century there came to be a distinction between refracting opticians and dispensing opticians. Refracting opticians became known as optometrists.

## **9. When was the American Optometric Association formed?**

It was formed in 1898 as the American Association of Opticians. In 1910, the name was changed to the American Optical Association. By this time, many of its members called themselves optometrists. In 1919, the name was changed to the American Optometric Association.

## **10. When did the existing US optometry schools start?**

Private schools:

- Illinois College of Optometry traces its roots to 1872 (some of its predecessor schools were Northern Illinois College of Ophthalmology and Otology, Needles Institute, Northern Illinois College of Optometry, Monroe College of Optometry, Chicago College of Optometry)
- New England College of Optometry traces its roots to 1894 as the Klein School of Optics (NEWENCO was at one time known as Massachusetts College of Optometry)
- Southern California College of Optometry started in 1904 as the Los Angeles Medical School of Ophthalmology and later known as the Los Angeles College of Optometry
- Pennsylvania College of Optometry, 1919
- Southern College of Optometry, 1932

University schools:

- Ohio State University, 1914
- University of California Berkeley, 1923
- Pacific University, 1945 (originally North Pacific College of Optometry, a private school founded in 1921)
- Indiana University, 1951 (pre-optometry started in 1951; first professional optometry class started in 1953)
- University of Houston, 1952
- University of Alabama Birmingham, 1969
- State University of New York, 1970
- Ferris State University (Michigan), 1974
- Northeastern State University (Oklahoma), 1979
- University of Missouri St. Louis, 1980
- Inter American University of Puerto Rico, 1981
- Nova Southeastern University (Florida), 1989

The first university optometry school was at Columbia University. It opened in 1910 and closed in 1954.

### **11. How did the use of the Doctor of Optometry (OD) degree develop?**

Various doctor titles were awarded even before 1900. The Philadelphia Optical College may have been the first to give a doctor's degree to optometry graduates when it awarded the Doctor of Optics degree in 1889. Before about 1920, optometrists generally resisted using the term doctor, but this attitude gradually changed through the 1930s and 1940s.

In 1950, all ten of the optometry schools in existence at the time required five years of study past high school. The private schools all offered the OD degree. Ohio State, University of California Berkeley and Indiana did not offer the OD degree until switching to a six-year pre-optometry and optometry curriculum. IU graduated its first OD class in 1968 and Berkeley graduated its first OD class in 1970.

### **12. What were the original stimuli for optometry to start studying ocular disease, and when were the first optometry diagnostic and therapeutic pharmaceutical agent laws passed?**

Original stimuli for optometry to move into the area of ocular disease:

- a. interest of some optometrists
- b. Optometrists were distributed more evenly across the country and were the only eye/vision practitioner in many rural areas and small towns. Optometrists had to refer eye disease to either the local general practice physician or to an ophthalmologist that may have been many miles away. Optometrists had more knowledge of the eye and had better instruments to view the eye (e.g., slit lamp biomicroscope) than the local GP MDs, so it was good for rural or small town patients to be treated for minor eye disease by the local optometrist than by the local GP MD
- c. criticism by ophthalmologists - ophthalmologists sometimes had public campaigns that optometrists were poorly trained in eye disease

first DPA law – Rhode Island, 1971

first TPA law – West Virginia, 1976

Despite this change, practices of IU alumni average about 7% of their income from the treatment of eye diseases – see Goss DA, Grosvenor T. Summary of optometry alumni survey. *Indiana Journal of Optometry* 1998;1(2):26-28.

### **13. What were oculists and what lesson does the history of oculists and ophthalmologists provide for optometry today?**

Oculists were eye care physicians who did not have residency training in ophthalmology.

Optometrists knew more about refraction and prescription of lenses.  
Ophthalmologists knew more about eye surgery and eye disease.

So as residency training in ophthalmology became more common, oculists were no longer needed.

Ophthalmologists were not greatly interested in refraction and eyestrain until the late 19<sup>th</sup> century and early 20<sup>th</sup> century.

Thomas Hall Shastid quotation in Borish article, IJO, Fall, 2001, p. 24:

ΔThe M.D.s generally would not recognize even the existence of such a thing as eyestrain....If there was any worse quackery than this of the regular medical profession, I do not know what it was. Yet they called >quacks those of us who fitted glasses to the eyes of the young....There were certain traveling >spec-peddlers= who went from house to house fitting glasses and unskillful though they were, relieving many of the simpler cases of eyestrain headache...Such men, speaking generally, excited extreme contempt and bitterness on the part of the >regular=profession, feelings which grew the more the >spec-peddlers= best these scientific M.D.s at the treatment of eyestrain and its numerous results....Hardly anything that now I can recall served so much to weaken the standing and influence of physicians in any community than this absurd, ridiculous, hard-headed, stubborn...opposition to the fitting of glasses.Ⓜ

Along with the Δspec-peddlersⓂ that Shastid refers to, persons who provided people in need with spectacles included respectable and professional optometrists, but in the minds of many physicians, the optometrists weren't much better than the spec-peddlers.

As American ophthalmologists started realizing the importance of spectacles, they learned the methods of refraction from optometrists - quotation on pages 136-137 of Hirsch and Wick discusses how the McAllisters taught oculists how to do refractions

The emphasis on good refraction techniques by optometrists and the precedence of optometrists in refraction has resulted in our pre-eminence in this area to the present day.

Lesson for today: Every profession justifies its existence (in part) by being better at something than any other profession (a niche). We need to maintain our strength in the treatment of refractive problems and eyestrain.

#### **14. What are some major optometric organizations and when did they begin?**

a. American Optometric Association mentioned earlier

b. American Academy of Optometry - organized in 1922, serves to promote professionalism and high standards of patient care and to disseminate information through its journal, Optometry and Vision Science (previously known as American Journal of Optometry and Archives of the American Academy of Optometry and then later as the American Journal of Optometry and Physiological Optics)

offers Fellowship status (FAAO) in general optometry and diplomate status in optometric specialties

c. Optometric Extension program traces its roots to a plan developed by the Oklahoma Optometric Association in 1928 for membership education.

It quickly became a nationwide organization. It developed a standardized system of testing with numbered tests that helped promote standardization of testing that was badly needed at the time.

Today OEP emphasized what is often referred to as behavioral optometry.

d. College of Optometrists in Vision Development developed in the early 1970s (see Wold history article in JOVD for correct details) by merger of three small organizations. This is an organization of optometrists who practice vision therapy.

They offer a certification program. Optometrists who complete it are Fellows of the College of Optometrists in Vision Development (FCOVD).

## **15. When and how did the optometry program at Indiana University begin?**

Discussions began in the 1930s.

The person who had the most to do with developing the idea of an optometry school at IU and with leading the effort to convince the appropriate people for the need of the school was John P. Davey, an Indianapolis optometrist.

John Davey (1893-1954)

originally trained as a lawyer later went to optometry school

secretary of Indiana Board of Optometry for many years

promoted high standards - the Board failed many applicants from proprietary schools

Davey discussed the possibility of a new school with Indiana optometrist Noah Bixler and on fishing trips with Wilbur Pell, Sr. (Lawyer for optometry state board) and Paul Harmon (physiology prof at IU)

Irvin Borish, who had been a professor and administrator at Northern Illinois College of Optometry, entered practice in Kokomo in 1944; Davey and Bixler asked him to work with them to start negotiations to start the school

Harmon arranged for Davey, Bixler, Borish to meet with Herman Wells (IU president); Wells met with them and asked them to come back as official representatives of the Indiana Association of Optometrists (IAO).

Initially there was resistance from some members of IAO, especially those with ties to William Needles, owner of the Northern Illinois College of Optometry. A speech by Ed Cain, 1945 president of the IAO, at the 1945 IAO meeting led to support of almost all

optometrists in the state. In 1945, the IAO formed the School Committee charged with founding the optometry school. Membership on the committee from 1945 to 1951 included John Davey (Chairman), Noah Bixler, Irv Borish, Loyd Wedeking, Galen Kintner, E. C. Doering, Kenneth Kintner, Robert Tubesing, and C. Earl Fisher.

Davey et al. returned to talk to Wells as official committee of IAO in 1945; Wells appointed Herman Briscoe, Dean of Faculties at IU, to handle working with the IAO concerning the school and to learn more about the requirements and implications of having an optometry school at IU.

In 1947, there was an attempt to pass a law to dedicate a portion of licensure fees to optometry school, but the bill failed.

In 1947, Briscoe presented a plan for an optometry school at IU to the IU Board of Trustees and the Trustees approve it. But later, due to medical school opposition, the Trustees rescind their motion.

Indiana optometrists tried unsuccessfully for many months to convince ophthalmologists at IU School of Medicine of the importance of an optometry school.

Briscoe told the Indiana Optometric Association (IOA) school committee that they may have to go to legislature. They immediately tried in the 1949 session but the bill gets held up in committee and the session ends without the bill being voted upon.

The next legislative session was 1951. The Indiana optometrists organized a huge effort to contact all legislators that they knew personally and tell them about the importance of having an optometry school at IU. Along with Davey and the School Committee, Virgil McCleary (IOA president in 1951) and other Indiana optometrists played an important role in organizing the legislative effort. The bill to start the school passed the state House of Representatives unanimously (92-0) and passed by overwhelming margin (39-3) in the state Senate

Briscoe hired Henry Hofstetter to be the first Director of the optometry program. Hofstetter started in 1952, and worked for a year drawing up curriculum, hiring faculty, ordering equipment, and making other arrangements

The first optometry class at Indiana University entered in the fall of 1953.

For more on the history of the founding and early years of the optometry school at Indiana University, see: Goss DA. History of the Indiana University Division of Optometry. *Indiana Journal of Optometry* 2003; 6(2):27-74.

## References

Hofstetter HW. Optometry: Professional, Economic, and Legal Aspects. St. Louis: Mosby, 1948.

Hofstetter HW. Education in optometry. Higher Education 1950;7(3):25-29.

Rosen E. The invention of spectacles. J Hist Med Allied Sci 1956;11:13-46,183-218.

Gregg JR. The Story of Optometry. New York: Ronald Press, 1965.

Hirsch MJ, Wick RE. The Optometric Profession. Philadelphia: Chilton, 1968.

Tannebaum S. William Molyneux: Dioptrica, a 17<sup>th</sup> century classic. J Am Optom Assoc 1972;43:566-570.

Hofstetter HW. Optometry of Daza de Valdes. Am J Optom Physiol Opt 1988;65:354-357.

Rosenthal JW. Spectacle and Other Vision Aids: A History and Guide to Collecting. San Francisco: Norman Publishing, 1996.

Enoch JM. Early lens use: lenses found in context with their original objects. Optom Vis Sci 1996;73:707-715.

Hofstetter HW. The OHS mission. Hindsight: Newsletter Optom Hist Soc 1996;27(3):17-18.

Park D. The Fire Within the Eye: A Historical Essay on the Nature and Meaning of Light. Princeton, NJ: Princeton University Press, 1997.

Koetting RA. The American Optometric Association's First Century. St. Louis: American Optometric Association, 1997.

Borish IM. Optometry: Its heritage and its future. Indiana J Optom 2001;4(2):23-31.

Woodruff CE. The evolution of optometric education in America. J Am Optom Assoc 2001;72(12):779-786.