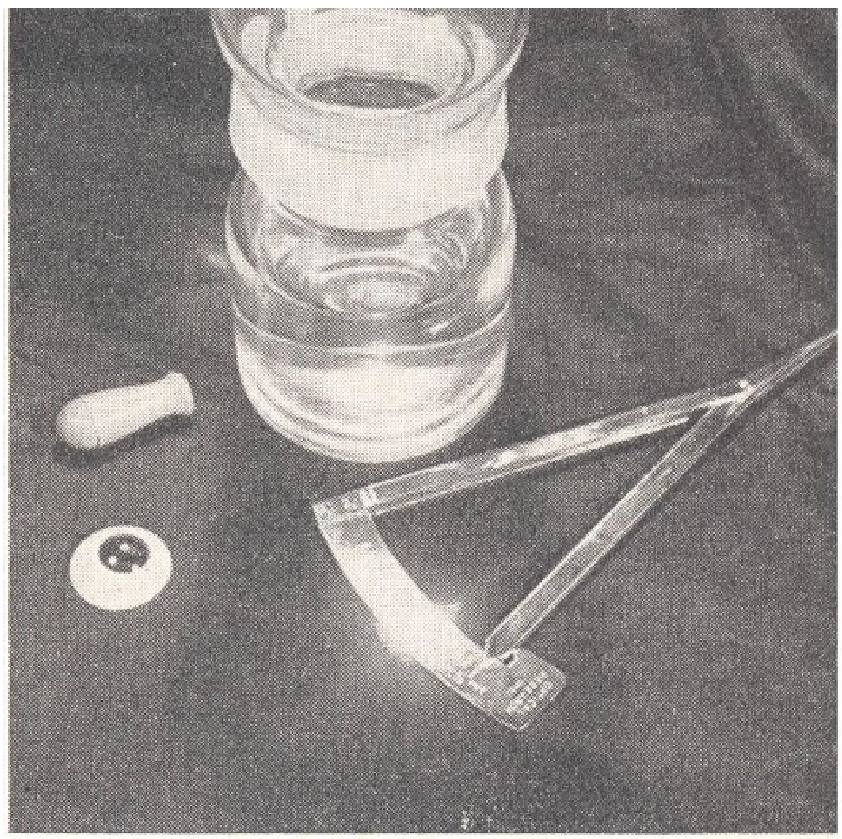
HINDSIGHT
Journal of Optometry History

April, 2015 Volume 46, Number 2

Official Publication of the Optometric Historical Society



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 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.

The official publication of the Optometric Historical Society, published quarterly since its beginning, was previously titled:
Newsletter of the Optometric Historical Society, 1970-1991 (volumes 1-22), and
Hindsight: Newsletter of the Optometric Historical Society, 1992-2006 (volumes 23-37).
Use of the current title, Hindsight: Journal of Optometry History, began in 2007 with volume 38, number 1.
Volumes 1-42 are available online at:
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On the cover: Some of the equipment for fitting scleral contact lenses from a 1942 textbook by William Feinbloom. See the article starting on page 27.

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Historical Note on Subjective Refraction, Trial Lens Sets, and Phoropters

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For many years after the invention of spectacles in the late thirteenth century, the lenses available were plus lenses for presbyopia. Spectacles were initially ordered on the basis of the buyer's age.[1] The first documented use of spectacles for myopia was in the fifteenth century.[1] In the 1623 book *The Use of Eyeglasses* by Daza de Valdes there was a diagram with which individuals could find their punctum remotum and from that determine the power of concave lenses they needed for myopia.[2] For presbyopia, Daza de Valdes recommended convex lens powers based on age.[2]

As spectacles came to be mass produced, buyers could visit a shop and pick from a supply of spectacles the ones that seemed to work best for them or they could buy from the stock carried by a traveling spectacle peddler. Gregg[3] referred to this as "do-it-yourself fitting of glasses." Obviously this allowed neither careful determination of refractive error nor individualized correction of conditions such as anisometropia or astigmatism.

The availability of equipment such as trial lens sets, and later phoropters, made it possible to perform some sort of subjective refraction testing procedure. This allowed the making of individualized lens prescriptions, and of particular significance, it advanced the process of obtaining spectacles from an interchange between buyer and seller to the provision of a service.

Bennett[4] credits a German monk named Johann Zahn (1641-1707) with describing the first rudiments of a subjective refraction procedure. Zahn made a plano-convex polyspherical lens and a plano-concave polyspherical lens. Each consisted of a single piece of glass with six concentric zones of different powers. The zones of different power could be sequentially brought in front of the eye to estimate spherical refractive error. Zahn was also aware that the distance of the punctum remotum from a myopic eye could be used to determine the focal length of the correcting lens.[4]

Credit for the development of a trial lens case generally goes to a Bavarian physician Georg Fronmüller (1809-1889) because in 1843, he published the first account of designing one.[4,5] However, it is known that English opticians Jesse Ramsden (1735-1800) and William Cary (1759-1825) had ranges of different lens powers used for refractive testing prior to that.[5] Even though trial lens sets made it possible for some opticians to make glasses to order as early as the eighteenth century, spectacle shops with do-it-yourself fitting and spectacle peddlers persisted for many more years.

An appreciation of the development of refractive procedure would not be complete without some consideration of the contemporary knowledge of refractive errors. For many years, hyperopia was not distinguished from presbyopia. Levene[6] suggests that the writings of physicians William Charles Wells (1757-1817) and James Ware (1756-1815) were the first to recognize the difference, but that it wasn't until the work of Frans Cornelis Donders (1818-1879) that hyperopia "was treated adequately, both clinically and on a sound scientific basis."

An understanding of refractive methods in the late nineteenth century can be gained from the 1896 book *The Human Eye – How to Correct its Defects by Properly Fitting Glasses* published by Queen and Company, the company that had originally been started by American optician James Queen (1811-1890). They noted that the test for hyperopia was that the eye can see "as distinctly, or more distinctly, through a convex lens." To determine the amount of hyperopia, they recommended covering one eye and then placing in the trial frame "successively stronger and stronger convex lenses, until they become so strong that the distant vision is less distinct," with the lens correction being "the strongest lens that left the vision clear."[7]

Queen and Company said that if distance visual acuity was reduced and near visual acuity was better than distance visual acuity, it could be deduced that myopia was present. They advised that the selection of minus lens power for each eye could be guided by the level of distance visual acuity in that eye, and that the weakest concave lens that resulted in the best distance visual acuity was the amount of the myopia.[8]

For presbyopia, Queen and Company recommended lens powers based on the near point of accommodation and the habitual near point working distance. In a table of dioptric lens powers, they had columns with working distances of 30, 20, 15, 12, 10, 9, and 8 inches, and rows with near points of accommodation of 8, 9, 10, 12, 15, 20, 30 and more than 40 inches. For example, for a working distance of 15 inches and a near point of accommodation of 20 inches, we find in their table that they recommended +1.25 D. Parenthetically, the fact that they repeated the table with lens powers in focal length inches[9] illustrates that the diopter still hadn't achieved universal acceptance.

To test for astigmatism, Queen and Company advised using a distance astigmatic test card in which there are "sets of parallel black and white lines of uniform size, running in different directions."[10] These could in the form of "astigmatic letters" in which the letters are made up of parallel stripes with varying orientation from letter to letter or in the form of lines radiating from a common center, as in a clock dial.[10] In his 1896 book, Bohne[11] stated that he found striped letters designed by a Dr. Pray and a Dr. John S. Owens to be more "convenient" for finding the axis of astigmatism than a "fan or a dial" target.

In the early twentieth century, common tests for astigmatism were clock dial like targets, which some optometrists mounted with a pin in the center so that finer gradations of axis other than the separations of the lines could be obtained, and the “swinging cylinder” method in which a cylinder lens was rotated back and forth in a trial frame until the patient reported that visual acuity was best.[12] Irish mathematician and physicist George Gabriel Stokes (1819-1903) had designed a lens system which acted as a variable power cross cylinder in the 1840s for the measurement of astigmatism, but it never achieved common usage.[13] In papers published between 1887 and 1907, American ophthalmologist Edward Jackson (1856-1942) described testing procedures for astigmatism which have come to be known as the Jackson cross cylinder test.[4] Slowly over the first three or four decades of the twentieth century it became the preferred subjective method of astigmatism measurement that it is today.

A significant development in the field of refraction was the invention of the phoropter. Bennett[4] credits French ophthalmologist Marc Antoine Girard-Teulon (1816-1887) with producing a prototype of what might be considered a phoropter. However, it was Henry L. De Zeng, Jr. (1866-1929) who made the phoropter as we have come to think of it today, an instrument useful for both distance and near testing, with accessories such as rotary prisms, cross cylinders, and Maddox rods.

In 1885, De Zeng started working for an optical company. Later he attended Hobart College, studied medicine in Chicago, and took refraction and optics courses.[14,15] Between 1895 and 1915 De Zeng patented 41 inventions, including a refractometer, a phorometer, an electric ophthalmoscope, the first battery handle ophthalmoscope, and other diagnostic equipment.[14,15] De Zeng’s first phoropter was patented in 1909, which was then produced in somewhat altered form by the De Zeng Standard Company.[16] In 1917, De Zeng published a 68 page manual entitled *The Modern Phorometer, Including the Phorometer-Trial Frame, Phoro-Optometer, and the Rotary Cross Cylinder,* and five years later, he published a 120 page book entitled *The Phoroptor.* In 1925, De Zeng sold his company to American Optical Company.[17] American Optical produced phoropters similar to the De Zeng phoropter into the 1940s. A competing phoropter was the Bausch & Lomb Greens’ Refractor, developed in the 1930s by Clyde L. Hunsicker, Aaron S. Green, Louis D. Green, and M.I. Green.[18]

Optometers have often served as an adjunct or even a replacement for subjective refraction. Optometers can be as simple as a single convex lens with a scale or they can incorporate elaborate optical systems. Scottish physician William Porterfield (c.1696-1771) was the first to describe an optometer in a 1737 paper and in his 1759 two volume *Treatise on the Eye, the Manner and Phaenomena of Vision.*[19] Porterfield’s optometer made use of the Scheiner double aperture principle.[19] Later Thomas Young (1773-1829) used an improved version of Porterfield’s optometer to discover his own astigmatism.

An excerpt from the 1895 correspondence course offered by Dr. H.A. Thomson of the South Bend College of Optics illustrates not only the type of optometer occasionally in use at the time, but also Dr. Thomson’s attitude toward them: “Although I hope none of my pupils will ever be so unscientific as to use an optometer, it is desirable to understand the principles upon which it is constructed. The common optometer consists of a convex lens through which the patient looks at a card attached to a slide. The card is moved until seen most distinctly, when we have the focus of the eye. If it stopped at the principal focus of the lens we know that the rays emerged parallel and that he is emmetropic. If beyond the principal focus they emerged converging showing him to be hypermetropic; if nearer than the focus, diverging, and he is myopic. By marking the slide at different distances we have only to look where the card stands and the number tells the glass required. Other more complicated optometers are on the market, but are based on the same principle. The objection is that accommodation, convergence, astigmatism, etc., are not considered, thus rendering the instruments inaccurate."[20] The 1896 manual by Queen and Company gives a similar opinion about optometers when they state: "Although in some cases convenient, they are not so generally applicable or useful as even a small set of test-lenses; and those who have most to do at testing eyes almost invariably prefer the trial case."[21]

The late nineteenth century and early twentieth century saw the development of several optometers which went by names such as punctumeter, refractometer, ophthalmometroscope, stigmatometer, ametropometer, ametrometer, autophoro-optimeter, and refractionometer.[22,23] Problems with alignment and instrument accommodation limited their usefulness. A significant development in the automation of optometers was the introduction of the Bausch & Lomb Ophthalmetron in 1971. Since then many more autorefractors have appeared on the market.[23,24] Even with improvements in technology, Grosvenor in 2007 stated that autorefraction was not a suitable substitute for subjective refraction and that retinoscopy by an experienced clinician is a better starting point for subjective refraction than is autorefraction.[25]

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Half a Century Ago: Optometric Education in the United States in the 1960s

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From the mid-1950s when the optometry school at Columbia University closed to the fall of 1969 when the school at the University of Alabama Birmingham opened, there were ten optometry schools in the United States at: Illinois College of Optometry, Indiana University, Los Angeles College of Optometry, Massachusetts College of Optometry, The Ohio State University, Pacific University, Pennsylvania College of Optometry, Southern College of Optometry, University of California Berkeley, and University of Houston.

In the early 1960s, nine of the ten schools required a minimum of two years of college pre-optometry study followed by three years of optometry school.[1] The exception was Pennsylvania State College of Optometry which, starting in 1955, required a total of six years, two years of pre-optometry and four years of optometry school, with the Doctor of Optometry (O.D.) degree being awarded at the end of the fourth year.[1,2] At the University of Houston and Massachusetts College of Optometry, professional qualifying degrees were earned after three years of optometry school, but students could take an optional fourth year to earn an O.D. degree.[1] Although the minimum requirement for optometry school entrance was two years of college study, many students had more than that. For example, at Pennsylvania College of Optometry from 1961 to 1968, entering students averaged three and a third years of previous college credit.[3]

By 1965, six optometry schools were requiring six years of study, two years pre-optometry and four years of optometry school.[4] By 1967, all ten schools had initiated six year programs.[2] Six years of study allowed optometry schools at public universities to award the O.D. degree because their governing boards required six years of study minimum for the granting of a doctoral degree. The last school to adopt the O.D. degree was the University of California School of Optometry.[5] They awarded their first O.D. degrees in 1970. Reasons given for the expansion to four years at University of California, for example, were advancements in physiological optics and optometry along with increased interest in visual performance, as well as the opinion of alumni that there should be expanded coverage of ocular disease, pharmacology, contact lenses, pediatric and geriatric optometry, and practice management.[5]

It was widely accepted that there was a shortage of health care professionals, including optometrists, in the 1960s. One study in the early 1960s estimated that 750 new optometry graduates were needed annually in the United States to make up for retirements and population increases.[6] The actual number of graduates nationwide was between 300 and 400 each year from 1956 to 1965.[7] The number of registered optometrists in the United States dropped from 22,136 in 1956 to 20,610 in 1966.[8]

Writing in 1967, Baldwin[9] agreed with the United States Public Health Service that there was a need for more optometrists. A commonly accepted standard was that there should be one optometrist per about 7,000 population. He argued that there should probably be more optometrists than that due to “the expansion of valid methods for improving human visual performance.” When speaking of the number of optometrists, he said: “The gap between the supply and the need is in grave danger of becoming wider.”[9] At that time optometrist to population ratios varied from one to about 5,000 in Illinois and Oregon to one optometrist for approximately 18,000 population in some states in the southeastern U.S. Baldwin noted that increasing the number of optometrists could be achieved by increasing enrollments at individual schools or by increasing the number of schools.

Enrollment ceilings were established by the American Optometric Association (AOA) Council on Education for each school based on factors such as admission standards, rate of attrition, faculty, curriculum, achievement standards, physical facilities, clinical program, financial status, research activity, demand for graduates, current enrollment, and particularly, the Council’s last evaluation of the school.[10] Baldwin was in favor of those ceilings, and he agreed with the assessment of the AOA Council on Education that the number of schools should be increased. Baldwin argued against increased tuition income being a financial incentive to schools to increase their enrollments, because he calculated that tuition could not be expected to provide more than about half of the expense of educating one student, regardless of the number of students. He suggested that the number of schools be at least doubled and that new schools be established at universities. Addressing concerns about an adequate number of qualified faculty for a greater number of schools, he did not expect that to be troublesome because the number of persons completing Ph.D. degrees in physiological optics and related areas was increasing. He also argued that practicing optometrists could be recruited by the schools to faculty positions if salaries were made competitive.[9]

Baldwin’s call for a doubling of the number of schools was not achieved until 2009. In the 1960s there were, however, increases in enrollments at each of the ten schools. The increases in enrollments from 1960-61 to 1964-65 ranged from 14% at Los Angeles College of Optometry to 103% at Pennsylvania College of Optometry.[5] The number of optometry school graduates in the United States increased from less than 400 per year from 1956 to 1965 to being between 400 and 500 each year from 1966 to 1970.[7]

Federal legislation in 1963 and 1965 provided funds to health professions schools for construction grants, educational improvement grants, student loans, and scholarships.[11,12] The aim of this funding was to increase the numbers of graduates as well as to improve the quality of professional education. All ten optometry schools took advantage of this funding.[2]

One potential measure of the level of education offered could be the degrees earned by faculty. In 1962, 77% of optometry faculty held a doctorate degree, the highest degree being an O.D. in 49% of faculty, a Ph.D. in 19% of faculty, and another doctorate in 8%.[6] In the 1960s, there were six programs designed for optometrists to complete graduate degrees.[13] The University of California Berkeley, Indiana University, and The Ohio State University offered M.S. and Ph.D. programs in physiological optics. An M.S. degree in perceptual psychology, physiological optics, or clinical optometry could be pursued at Pacific University. Optometrists who had completed five years of pre-optometry and optometry college credit could also attend programs at the University of Houston or Massachusetts College of Optometry to complete a Doctor of Optometry degree.[13] From 1961 to 1970, Indiana University awarded 39 M.S. and 12 Ph.D. degrees in physiological optics, University of California granted 10 M.S. and 8 Ph.D. degrees in physiological optics, Ohio State awarded 7 M.S. and 3 Ph.D. degrees, and Pacific granted 11 M.S. degrees.[14]

In 1969, the number of optometry schools in the United States increased to eleven with the opening of a school at the University of Alabama Birmingham. They started with a class of eight students in the fall of 1969 to become the first university connected optometry school in the Southeastern United States.[15] It was also the first optometry school designed to be incorporated into a university-based academic health sciences complex.

In the 1960s, the number of optometry school applicants was increasing over the levels in the late in 1950s, and the grade point averages of entering students were higher than in previous decades.[16] For 1962, the ratios of applications to entering students at the ten optometry schools ranged from 1.27:1 to 3.53:1.[6] Levine and Baldwin[16] recommended that in addition to grade point average, information from interviews, letters of recommendation, a personal data form, and tests such as the Graduate Record Exam, an occupational interest test, and a personality profile could be useful in selecting students from the applicant pool. They further recommended that optometry should construct a national selection test for optometry applicants with the assistance of a testing organization. Within a few years, the Optometry College Admission Test (OCAT, now OAT) was developed.[17,18]

The 1960s saw significant change and advancement in optometric education. The changes would be even greater in the 1970s.

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Authors of the First Contact Lens Textbooks: Beacher, Feinbloom, and Obrig

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One potential correlate of the popularity of a treatment regimen may be the demand created for textbooks on the topic. Based on searches on IUCAT (Indiana University's online library catalog), WorldCat (an online catalog of libraries around the world), and research by Knoll,[1-3] it appears that the first contact lens textbooks were published in the early 1940s. At that time plastic had recently been introduced as the material for contact lenses, replacing glass; and the lenses being fit were scleral lenses, as corneal contact lenses had yet to be invented. The first contact lens textbooks were written by L. Lester Beacher (1941), William Feinbloom (1942), and Theodore Obrig (1942). This article will present brief biographical sketches for each of these authors and discuss the content of their books.

Lawrence Lester Beacher

L. Lester Beacher (1905-1987) was born in Czechoslovakia.[4] He completed optometry school at Pennsylvania State College of Optometry in 1927. Available biographical data list numerous other degrees obtained between 1945 and 1975 from various institutions, such as McCormick Medical College, Philathea College, and London College of Applied Science.[4,5] He was a member of the American Academy of Optometry and the American Optometric Association, as well as a member of psychology and homeopathic medicine organizations.[4,5] He was a diplomate of the Contact Lens Section of the American Academy of Optometry.

Beacher taught at Pennsylvania State College of Optometry from 1927 to 1931.[4] According to the Pennsylvania State College of Optometry "Iris" yearbooks from 1928 to 1931, he taught theoretical optics, optometric technique, and clinical optometry, and from 1929 to 1931, he was chief of the Bronx County Optometric Clinic. The 1929 yearbook said that Beacher's "proficient manner of teaching so forcibly drove home the many hard aspects of his course, that in later years we will still be indebted to him for his instruction."[6] The 1972 American Optometric Association Directory lists him as doing contact lens fitting and being in general practice, with addresses in New York City and Orange, New Jersey.

Beacher published *Contact Lens Technique* in 1941, with a second edition also in 1941, a third edition in 1944, a fourth edition in 1946, and a fifth edition in 1974. The first edition was a small 115 page typescript book which Beacher self-published. The first edition instructed the reader in procedures for the insertion, removal, fitting, and evaluation of scleral contact lenses. While reviews of the book acknowledged that information concerning contact lenses was needed, they were generally lukewarm. A review of the first edition said: "As far as a hand-book can take the place of direct training this may be recommended."[7] Another for the second edition stated: "In his own way, Beacher tells the practical story of prescribing and making contact lenses."[8] With regard to the third edition, it was noted that: "As a practical means of instructing, the book may prove as useful as a book can be expected to prove."[9] A reviewer of the fifth edition said that optometrists "should not expect…this brief discourse to be a substitute for one of the standard texts."[10]

Beacher wrote several other books[1,2]: *Ocular Refraction and Diagnosis* (1931, 286 pages, self-published; 2nd edition, 1980, 205 pages); *Practical Optometry: A Treatise Describing Modern Technique of Eye Examination* (1934, 163 pages, self-published); *Your Precious Eyesight: A Concise and Comprehensive Anthology of Questions and Answers* (1952, 84 pages); *Corneal Contact Lenses: Presenting the History, Construction and Various Techniques in the Evolution of the Contact Lens* (1955, 45 pages, articles reprinted from *Optometric Weekly*); *How Can I Improve Myself? A Study in Practical Psychology* (1962); *Psychological Manifestations in Ocular Science: A Lexicon of Terms* (1968, 53 pages); and *Happiness and Success in Marriage* (1979, 82 pages). Beacher also wrote an autobiography entitled *The Rise of an Im[m]igrant to National Fame* (1985, 260 pages).[2]

William Feinbloom

William Feinbloom (1904-1985) was born in Brooklyn. He was the son of an optometrist and often worked in his father's practice before graduating from optometry school at Columbia University in 1923.[11,12] He continued his formal education while in optometry practice, earning a B.S. degree from City College of New York in 1927, an M.A. from Columbia in 1933, and a Ph.D. from Columbia in 1939.[11] The title of his Ph.D. thesis was "A Quantitative Study of the Visual After-Image."[1]

Feinbloom was well known as a pioneer in low vision, being sometimes referred to as the father of low vision.[12] He devised spectacle telescope systems, head mounted telescope systems, low vision microscopes, and other low vision aids. One of his notable early papers on low vision was an analysis of 500 low vision cases from his practice files.[13] One tribute stated that "millions of low vision patients worldwide owe at least an indirect debt to the tenacity and ingenuity of Dr. William Feinbloom."[12]

Feinbloom was also an innovator in contact lenses. In 1936 he patented a bifocal scleral lens.[14] In the late 1930s, he designed the first contact lens containing plastic. It had a glass central optical portion and a plastic outer portion over the sclera.[14-16] He later introduced an all plastic sclera lens called the Feincone lens.[14] Feinbloom was one of three original partners in the Frontier Contact Lens Company.[16] Knoll[17] observed that contact lenses gave Feinbloom another means of managing low vision and praised him for his "unusual ingenuity."

In 1942, Feinbloom published *The Practice of Fitting Contact Lenses* (46 pages). It was based on a series of articles published in the *Journal of the American Optometric Association* in 1941. It was organized into 12 "lessons," and well illustrated with more than 50 photographs and drawings. Instructions were given in selecting and handling lenses, evaluating fit, and doing a refraction over the contact lenses to determine power of the contact lens to be prescribed. The recommended procedure for the overrefraction involved use of a trial frame and measurement of vertex distance from the contact lenses to the lenses in the trial frame. A review of the book stated it represented "a satisfactory background of reading to enable a practitioner to acquire further training in the fitting of contact lenses."[18]

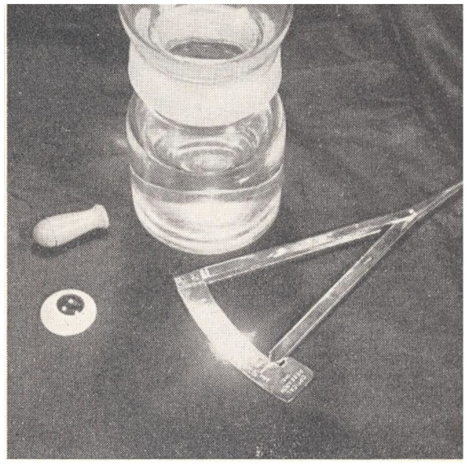

Figure 1. Some of the equipment used in fitting scleral contact lenses according to Feinbloom: a contact lens with central transparent optical portion and the opaque scleral portion, a suction device to aid removal of the lens, "one-half normal saline solution" obtained from a drug store, and a gauge used to measure vertex distance. (from Feinbloom W. The Practice of Fitting Contact Lenses. Minneapolis: American Optometric Association, 1942:23.)

Feinbloom also published a manual entitled *The Feinbloom Plastic Contact Lens: Manual of Instructions* (1940, 44 pages), and more than 30 papers in the *American Journal of Optometry* and *Journal of the American Optometric Association* on low vision, contact lenses, public health, and other topics. Feinbloom received an honorary D.O.S. degree from Northern Illinois College of Optometry in 1933.[11] The William Feinbloom Award is an award given annually by the American Academy of Optometry to an individual making distinguished and significant contributions to clinical excellence and to the direct clinical advancement of visual and optometric service.[19]

Theodore E. Obrig

Theodore Ernst Obrig (1894-1967) followed in the footsteps of his father, J.A. Theodore Obrig, as an optician. In 1914, after graduating from Columbia University, Theodore Obrig went to work at Gall and Lembke Optical Company, which was partly owned by his father.[20,21] Charles Lembke (1835-1903) of Gall and Lembke was the first president of the organization that would become the American Optometric Association. In 1901, Lembke sold his holdings in Gall and Lembke to Theodore Obrig's father.

Obrig volunteered in the French Army ambulance corps in World War I, and served for seven months.[20-22] When the United States entered the war, he joined the U.S. Army, serving in the medical department in France.[20,21] In 1919, Obrig once again went to work for Gall and Lembke. While working there, he patented the Myodisc bifocal spectacle lens for high myopia.

In the early 1930s, Obrig got interested in contact lenses, fitting ground glass sclera lenses.[21] In about 1936, he discovered the use of fluorescein with cobalt blue filters as a contact lens fitting aid. Obrig was one of the first to use an all plastic contact lens in 1938. He worked at Gall and Lembke until the late 1930s, when he founded Obrig Laboratories with Philip Salvatori.[21] Obrig retired as president of the company in 1952.

In 1942, Obrig published the first edition of *Contact Lenses* (470 pages). A second edition was published in 1947, and a third edition, with Philip Salvatori as second author, appeared in 1957. I examined a copy of the first edition. It is more comprehensive than the Beacher and Feinbloom books. Obrig devoted two chapters to ocular anatomy, biochemistry, and physiology. In the third chapter, he discussed the refractive and disease conditions in which contact lenses could be used and the vocational and avocational uses of contact lenses, with interestingly six pages on contact lenses in sports. Next were chapters on the optics of contact lenses and the development of them. The sixth through eighth chapters described the Obrig all plastic lens, the technique of making eye molds, and the procedure for fitting molded contact lenses. Next there was a chapter on solutions, and a final chapter reprinted some contact lens patents. A review of the first edition said that it was "well written" and presented "a review of the entire subject of prescribing and fitting contact lenses."[23] A review of the third edition said that it "should not be overlooked by anyone interested in any way in contact lenses."[24]

Obrig also published an earlier book, *Modern Ophthalmic Lenses and Optical Glass* (first edition, 1935; second edition, 1937; third edition, 1944). I examined a copy of the third edition. Topics in its 323 pages included history, manufacture, and characteristics of glass; colored lenses; refraction by lenses; history of spectacles; aberrations; single vision, bifocal, and trifocal lenses; contact lenses; telescopic spectacles; iseikonic lenses; cataract bifocals; vocational bifocals and trifocals; and prism compensation in bifocal segments. Obrig also described an optical slide rule made by Zeiss that "should be owned by every optician and refractionist." (page 294) A review of the first edition called it "a valuable contribution to ophthalmic optics."[25]

Acknowledgment

I thank the Gerard Cottet Library of Salus University for providing copies of pages from the Pennsylvania State College of Optometry yearbooks from 1928 to 1931.

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Biographical Notes on Benjamin Pike, Sr. (1777-1863) and Benjamin Pike, Jr. (1809-1864)

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The Pike family was important in the nineteenth century American optical and scientific instrument industry. Benjamin Pike, Sr. (1777-1863) was born in London, England. He immigrated to New York in 1798, and by 1804 he had started his own business selling optical and scientific instruments.[1] He had at least six children, three boys and three girls. The three sons, Benjamin Jr. (1809-1864), Daniel (1815-1893), and Gardiner (1825-1893) all worked for him and joined him in business at various times.[1,2]

Benjamin Pike, Sr. and all three sons identified themselves as opticians in city directories and census documents.[1] One writer observed that the term optician at that time often included more than just being an expert in the field of spectacles, as it also frequently "embodied the entire field of the construction of instruments for various sciences – meteorology, chemistry, and physics."[3]

According to an obituary, Benjamin Pike Sr. was well known for his mechanical skill and his shop was a frequent gathering place for men who worked in science and technology.[1] Pike Senior took Junior into partnership in 1831, and in 1837 they won a medal from Mechanics' Institute of New York. Junior later set up his own business in New York City. The date of the founding of his business is unclear – one source[1] says about 1843, while others[2,3] say 1839. Junior's instruments won medals at the American Institute Fairs and from the New York State Agricultural Society.

In 1848 and again in 1856, Benjamin Pike, Jr. published *Pike's Illustrated Descriptive Catalogue of Optical, Mathematical, and Philosophical Instruments. Manufactured, Imported, and Sold by the Author*, in two volumes. Volume I expanded from 342 pages in 1848 to 389 pages with the addition of a 47 page supplement. Volume II was 288 pages. There was a separate price list, which in 1856 constituted 66 pages. The two volumes included more than 750 engravings which illustrated the various instruments offered. Two different writers agreed in calling the catalog a "veritable textbook" because the instruments in them were described and their use explained.[1,2]

In the preface to the catalog, Benjamin Pike, Jr., speaking of himself in the third person, stated that he "having devoted himself from early youth to the manufacture of these instruments on a somewhat extensive scale, is satisfied that his collection of instruments is not surpassed, if equalled, by any in the country, for extent, style, quality, or cheapness…"(p. vi). Volume I included compasses, surveying instruments, globes, astronomical instruments, apparatus to demonstrate motion and mechanics, air pumps, hydraulic equipment, and electrical apparatus. Volume II included magnets, electro-magnetic instruments and machines, chemical apparatus, meteorological instruments, optical instruments, magic lanterns, microscopes, and miscellaneous other instruments. Among their optical instruments were spectacles, spectacle cases, monocles, magnifiers, opera glasses, telescopes, eye models, models of refraction by lenses, models of image formation, a model of the extraocular muscles, prisms, camera obscura, daguerreotype camera, and equipment to demonstrate polarization.

In the section on spectacles, it was explained that “if the lens of the eye is not of a proper convexity to bring the image” on the retina, “…we must make the rays pass through a glass of sufficient convexity to assist the eye…” (p. 149). If “the eye should be too convex, or short-sighted,… concave lenses must be resorted to… (p. 149). It was also noted that Wollaston designed a meniscus lens form that he called periscopic. Also available were pebbles, “made from blocks of rock crystal, usually brought from the Brazils, …ground to convex, concave, or periscopic forms.” (p. 151)

Spectacles seem to have held a particular interest to Benjamin Pike, Jr. In the preface to his catalog he said that: “In regard to Spectacles, Eye-Glasses, and Lenses for optical purposes of every description, his assortment is most extensive and complete. To this branch of his business he devotes special attention, furnishing Glasses or Pebbles that are truly ground, and properly adapted to the sight; feeling that so important a matter as vision should receive more attention than is usually given.” (pp. viii-ix)

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Miscellany

OHS Member Jerry Abrams celebrates 65 years in practice

The *Indianapolis Star* newspaper for January 22, 2015 had a nice article on long-time OHS member and former OHS president J.J. (Jerry) Abrams.[1] He was also featured in the March, 2015, issue of *Indiana Optometry News*, a publication of the Indiana Optometric Association. He has now been in practice in Indianapolis for 65 years. When he opened his office on January 19, 1950, at 22 years of age, he was the youngest optometrist in the State of Indiana. Now, at 87 years of age, he is said to be the oldest optometrist in the state.

Abrams grew up in Indianapolis and attended Indiana University for a short period of time before enlisting in the Navy. After completing military service, he attended Northern Illinois College of Optometry, graduating a few years before the optometry school started at Indiana University.

Abrams currently practices three afternoons a week at Abrams Eye Care on the west side of Indianapolis. He has been in practice with one of his sons, John, an ophthalmologist, for about 15 years. He is a life member of the Indiana Optometric Association, a Fellow of the American Academy of Optometry, and an active participant in Volunteer Optometric Service to Humanity. On January 15, 2015, he received the Sagamore of the Wabash award, an honor bestowed by the Indiana Governor for distinguished service, from Governor Mike Pence.

More on Theodore Brombach

In the article on the history of the Distinguished Service Foundation of Optometry in the last issue of *Hindsight*,[2] Theodore Brombach (1884-1961), who appears to have been the first optometrist to publish a book on visual fields, was discussed. An unanswered question was why the wing added to the optometry building at Pacific University in 1967 was named for him. Archives at Pacific University indicate that the wing of Pacific University's Jefferson Hall constructed in 1967 was named Brombach Wing because funding for it came from a bequest from his estate.[3] Willard Bleything,[4] a Pacific alumnus and former Pacific University College of Optometry Dean, suggested that Brombach may have felt a connection to Pacific because Brombach's work with color visual fields was taught at Pacific, and Pacific faculty member Hugh Webb published some material on Brombach's work.[5]

Decline in number of EENT specialists

An article in *Survey of Ophthalmology* asked the question, "Whatever happened to the EENT specialists?"[6] In the early nineteenth century, according to the author, there was a resistance among physicians against specialization because it "was considered a restriction of their general medical diagnostic skills and interests." The journal *Archives of Ophthalmology and Otolaryngology* was started in 1869. The Section of Ophthalmology and Otolaryngology in the American Medical Association, its first specialty section, was formed in 1878.

In the mid-1930s, over 50% of life members of the American Academy of Ophthalmology and Otolaryngology (AAOO) practiced EENT and about 20% limited their practices to ophthalmology, but among new members, only 3% were practicing EENT and about 30% were ophthalmologists. In 1977, about 2% of AAOO Fellows were listed as ophthalmologists/otolaryngologists. In 1979, AAOO separated into the American Academy of Ophthalmology and the American Academy of Otolaryngology – Head and Neck Surgery. In 2012, neither of the two organizations had anyone who was an EENT physician as a member. The author noted that EENT physicians disappeared from large cities before small cities.

Is a Medieval Anglo-Saxon eye potion an effective antibiotic?

A tenth century eye potion from an early medical book, *Bald's Leechbook*, was recently studied in a United Kingdom microbiology laboratory.[7] The recipe included garlic, onion, wine, and bile from a cow's stomach brewed in a brass vessel, left standing for nine days and strained through a cloth. Initial testing showed it to be highly effective against Staphylococcus, including methicillin-resistant Staphylococcus aureus (MRSA). Translation of the manuscript from Old English was done by an English professor at the University of Nottingham. This appears to be a good example of how knowledge from the past shouldn't be underestimated.

Statistics for online use of Hindsight

This past year is the first full year that back issues of *Hindsight* have been available online. Statistics from IUScholarWorks indicate that during the 2014 calendar year there were 3,291 hits on issues of *Hindsight* and its indexes. Of the 168 issues and 4 indexes currently online, there were 130 with at least one hit. Some issues had over one hundred hits.

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