

HINDSIGHT

Journal of Optometry History

April, 2013

Volume 44, 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, 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.

Officers and Board of Trustees of the Optometric Historical Society (with years of expiration of their terms on the Board in parentheses):

President:

John F. Amos (2015), email address: eyedoc@uab.edu

Vice-President:

Alden Norm Haffner (2014)

Secretary-Treasurer:

Chuck Haine (2016)

Trustees:

Jerry Abrams (2013)

Arol Augsburg (2013)

Irving Bennett (2016)

Jay M. Enoch (2014)

Morton Greenspoon (2015)

Alfred Rosenbloom (2015)

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.

On the cover:

This is a photograph of a historical advertisement that hangs in the office of OHS member Gary Williams. It advertises the services of Fred Hamilton, a turn of the twentieth century optometrist. In the advertisement Hamilton referred to himself as an optician; the term optometrist wasn't commonly used until about a decade into the twentieth century. Excerpts from memoirs written by Fred Hamilton are included in this issue.

HINDSIGHT: Journal of Optometry History

April, 2013

Volume 44, Number 2

Editor:

David A. Goss, School of Optometry, Indiana University, Bloomington, IN 47405,
dgoss@indiana.edu

Contributing Editors:

Jay M. Enoch, 5537 106th Avenue NE, Kirkland, WA 98033-7413,
jmenoch@berkeley.edu

Irving Bennett, 5551 Dunrobin Drive, #4208, Sarasota, FL 34231, or 3307 Seventh
Avenue, Beaver Falls, PA 15010, irvbennett23@gmail.com

TABLE OF CONTENTS

Letter to the Editor: J.P.C. Southall and Columbia University, <i>A.N. Haffner</i>	18
Late in Life Recollections of a Turn of the Twentieth Century Optometrist.....	19
A Biographical Note on Bernard Vodnoy (1914-2006), <i>David A. Goss</i>	22
Miscellany, <i>David A. Goss</i>	25
Some Personal Recollections Related to the History of the Defocus Theory of Myopia Etiology, <i>David A. Goss</i>	28
OHS Membership Application Form.....	32

Journal subscriptions are registered by joining the Optometric Historical Society. The cost of an institutional or library subscription is the same as for personal membership.

Manuscripts submitted for publication should be sent to the Editor at the email or postal address above. A Word document attached to an email message is the preferred means of submission. Paper copy submissions sent by postal service will also be considered.

Letter to the Editor: J.P.C. Southall and Columbia University

A.N. Haffner, O.D., Ph.D.

201 E. 36 Street, Apt. 6F, New York, New York 10016, anhaffner@msn.com

Just a missive to your excellent piece about Professor Southall (Columbia University).¹ The third week of January 1957, just three weeks after my appointment as Executive Director of the Optometric Center of New York, I received a call from a storage facility of Columbia. The person who called said that he had "cleared out" most of the objects of the Optometry Department which closed in June 1956. But he had a painted portrait of Southall which he was going to discard in the garbage. I asked him (pleaded is more accurate) not to throw it out and that I would be at his facility within an hour. After a hectic cab ride to Morningside Heights, I retrieved the Southall portrait and also saw (and also rescued) a portrait of Professor Isidore Finkelstein. Is was alive and he literally cried when he saw his portrait. Both paintings are still hanging in the building of the SUNY College of Optometry (and I hope with reverence and pride). In 1964, I received a call from a young woman who asked about the Southall portrait. She came by to see the painting and it turned out to be Southall's granddaughter. I invited her to lunch and we took some photographs for her to take home. The closing of the Columbia program was a bitter and sad period for our profession.

Reference

1. Goss DA. Biographical notes on James P.C. Southall. *Hindsight: J Optom Hist* 2013;44:9-12.

Late in Life Recollections of a Turn of the Twentieth Century Optometrist

Editor's Note: The following contains some excerpts from a typescript document of the recollections of optometrist Fred Hamilton when he was 89 years old. It was provided by OHS member Gary Williams of Owego, New York. The 1892 New York State census shows Fred Hamilton, an 18 year old watchmaker, living in the household of William Lawrence, a 48 year old optician. The cover of this issue of Hindsight shows an advertisement of Fred Hamilton's services that hangs in Dr. Williams' office. The date of the advertisement is unknown. In the memoirs document, Hamilton said that he stayed in Owego until he was 24 years old, so if he was 18 in 1892, the advertisement would have been before about 1898 or 1899. In the advertisement Fred Hamilton identified himself as an optician. The term optometrist wasn't commonly used until about the first decade of the twentieth century. James Gregg, in his book on the history of the American Optometric Association, stated that Fred Hamilton was one of the members of the first executive board of that organization in 1898 and he exhibited a new refractometer at its first convention (pages 10-11). Also mentioned in Gregg's book is the fact that Fred Hamilton of Providence, Rhode Island was the chairman of Visual Safety Commission of the American Optometric Association in 1934 (page 134). According to Hamilton's memoir document, he practiced at various times in Owego, New York, and Providence, Rhode Island, and he taught in Syracuse and New York City. If he was 89 when this memoir was written and if the age of 18 in the 1892 New York State census is correct, that would make it about 1963 when this was written.

Experience was my teacher. It is like fingerprints. No two exactly alike...How can you sleep at night when you sleep all day? My sister often asked. The answer is simple. I do not sleep all day. I close my eyes and live with my experience. I try to keep alive whatever I wish to recall. Life is like a good show. It is enjoyable to review some of the performances. When I close my eyes at night or during the day I relive the high points of my eighty-nine years...

The story begins in my home town, Owego, New York, where I lived until I was twenty four years of age. My father was a contractor and builder mostly in churches. His work kept him away from home much of the time, but I spent my vacations with him. He took great care in teaching me how to use carpenter tools and stressed the importance of precision, however, he advised me not to be a carpenter. He was deeply interested that I should know all that he could teach me about business responsibilities. When I was twelve he gave me a pony and would send me to the bank to pick up the payroll. At that time he was building houses in East Orange, Orange Mountains, Mountclair, and Newark. After the payroll was made up he sent me on the pony to pay the men....

My mother died when I was 13. After that I had little supervision. At 14 I decided to work taking an apprentice job with W.A. Lawrence, a watchmaker, jeweler, and optician in Owego. My salary the first year was board and lodging. He wanted me in his home because of illness acquired in the Civil War would strike without warning in the middle of the night. I would run for the doctor, for almost no one had a telephone then. The next year he added 5 dollars a week. At that time jewelers were also opticians. They had pairs of glasses of sixty four different strengths to select from....The customer tried them on and the one he could see best with was it. If he purchased solid gold rimmed spectacles it became custom to remember some friend in his will.

Mr. Lawrence decided to become a graduate optician. He went to Dr. Becklin's School of Optics in New York City, the first school to turn out graduate opticians. He was in the second class to be graduated. The term of the course was four weeks as compared to the present four years with college degree, but it was sufficient to make the difference between the sixty-four stock lenses and a possible several thousand corrections ground to individual requirements. Mr. Lawrence became one of but three such trial case operators between New York City and Buffalo. It might take several appointments of trial and error before the final decision was reached and then he had to send to New York or Philadelphia to have the lenses made. It usually took three or four weeks to get them. Mr. Lawrence continued to be absent from the store. When I was eighteen I was made a partner in the store. It was then Lawrence and Hamilton. Shortly afterwards he passed on. I acquired the business, sold out the jewelry and moved to a two room office over the Post Office. The rent at that time was \$7.00 per month.

I went to New York and purchased new optical equipment from Fox and Stendike. Mr. Fox introduced me to Doctor Frank D. Skeel, one of the learned oculists of the day and an inventor of optical equipment. When I returned home I spent my spare time learning to use the equipment, and soon became an expert. When optical salesmen learned what I was doing, they would tell their customers and I soon found that I had several students to teach these new methods of eye examinations. This was the beginning of my teaching career....

In the early days of professional optics, the only course of instruction was from several one-man so called graduate opticians. Some schools gave a graduation certificate suitable for framing. I thought that I should have one and so made arrangements to go to the Eastern School of Optics. After three days the professor said, "You know more than I do. I have not had a vacation in two years. You take over." When he returned he gave me my diploma, but I had to stay on for four weeks because it had been announced in the local papers that I would be away for a month for a post-graduate course. I never displayed that diploma.

All went along well for some time. I purchased a place on the Susquehanna about two miles from my office and decided that a farmer's daughter I knew should be my wife and companion. We were married on October 1, 1896...Later we became business partners. This was a fine arrangement for she always remembered people

and their names. I could remember only their ailments. She was a wonderful hostess for my office. She would care for the babies, entertain the children, learn their names, and at Christmas time always send the little girls shell-rimmed glasses for their dolls....A woman once asked me, "who is the lady in your office." When I answered, "my wife," she "Oh, no, if she were your wife she wouldn't call you Doctor Hamilton. So you see my wife always knew the right thing to do and did it."

I became a charter member and a member of the first board of directors of the organization that has since become the American Optometric Association....Now every state recognizes optometry as a profession and has a law covering its practice. My teaching had attracted the attention of a wholesale optical house in Syracuse. They wanted me to come there and direct a Syracuse School of Optics. They would get their students from their optical customers. After a year and a half the call came from New York and I moved to the big city. My system of teaching proved to be a success. After five years of teaching...I arrived in Providence...

I was chairman of a committee for Rhode Island that established the visual accuracy necessary for safe driving in that state. This all came about when I had perfected a method of projecting images on a screen and showing just how visual defects affected the individual...for which I received a gold medal from the Distinguished Service Foundation....

The symptoms of eyestrain from defective sight and from improper seeing conditions are the same. We found that when a person returned and thought their glasses must be wrong when they really were correct, that their seeing condition must be wrong – not enough light, too much light, glare, or improper decoration. With the aid of one of the best lighting experts, we developed a method of prescribing light and when we knew that our correction of glasses was right it was necessary to go to the home, office, or factory and inspect seeing conditions. A young lady bookkeeper kept returning and complaining that glasses were not right, so we went to her office and found that she had only 2 foot candles to see her type of work. A change of lighting was the answer. My next step was to inspect the seeing conditions in Providence's largest industry. The lighting was terrible. They did not know that paint on the walls made such a difference in seeing clearly....Each patient was supplied with a report of how much light they should have for their type of work....

The Hamiltons had a full life of experience and pleasures, and when we retired we moved to Florida. My dear sister I am not sleeping all the time when my eyes are closed. I have time to travel and to collect memories and really see all that I wish...

A Biographical Note on Bernard Vodnoy (1914-2006)

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

School of Optometry, Indiana University, Bloomington, IN 47405, dgoss@indiana.edu

Abstract

Bernard E. Vodnoy (1914-2006) had a varied and productive career in optometry, serving as an educator, military optometrist, practitioner, lecturer, author, inventor, and equipment company owner. Much of his work in optometry was achieved after he contracted polio.

Key words: *Bernell Corporation, optometry books, optometry history, vision therapy equipment.*

Bernard Vodnoy served optometry as an educator, military optometrist, private practitioner, continuing education speaker, author, inventor, and supplier of optometric equipment. Most of his contributions came after he contracted polio in his 30s.

Bernard Eugene Vodnoy was born on August 12, 1914, in Chicago. In 1938, he graduated from Northern Illinois College of Optometry (NICO).¹ He then taught at NICO until 1941 when he joined the United States Army.² He served from 1941 to 1946 as an optometrist and training officer in the Army in the United States and Europe.³ Vodnoy practiced optometry from 1946 to 1948 in Michigan City, Indiana, and from 1948 to 1979 in South Bend, Indiana.² In 1949, Vodnoy contracted polio. After an acute stage in which he was almost completely paralyzed, he was able to return to optometry practice using a wheelchair.²

After his military service, Vodnoy started lecturing at various optometry meetings and appearing as a guest lecturer at optometry schools.³ He frequently spoke about vision training and found that meeting attendees often asked about the equipment that he used. This led him to found Bernell Corporation in 1954. The Bern in the name of the company came from his first name and the ell came from his wife's first name, Elsy.² Bernell became a leading seller of vision therapy equipment and sold other optometric equipment as well.

Vodnoy invented much of the equipment sold by Bernell. Among the vision therapy items he developed were Tranaglyphs, aperture rule trainer, the Polachrome Orthopter, and hand-held Vectogram holder.³ He also invented a tonometer which he called the Aplatton tonometer.³

In 1958, Vodnoy self-published *The Practice of Vision Care*.⁴ I have not seen a copy of his 1958 book, but I assume it is a precursor to his book *The Practice of Vision Care, Orthoptics and Corneal Contact Lens Care*. The latter book was first published in

1965 and went through several editions, with the sixth appearing in 1976. It was published by the Bernell Corporation in a comb binding and had six chapters. Topics of the chapters were (1) orthoptics, (2) corneal contact lenses, (3) visual field testing and tonometry, (4) spectacle dispensing and low vision aids, (5) general examination, and (6) office forms for practice management and development.

The Practice of Vision Care, Orthoptics and Corneal Contact Lens Fitting was not a typical textbook. It did not have standard pagination, but rather was a collection of writings on various subjects within the chapter topical areas. In the fourth edition, the chapter on orthoptics constituted about 200 pages which was over half of the book. Many of the topics were detailed descriptions of how pieces of Bernell equipment could be used in clinical practice. There were also Vodnoy's viewpoints on clinical practice, his thoughts on the importance of orthoptics, and numerous clinical tips. Statistics and references were not often cited, but rather Vodnoy presented his knowledge gained through experience. The first chapter of the book was also published as a separate book, *The Practice of Orthoptics and Related Topics*.

A review of the second edition of *The Practice of Vision Care, Orthoptics and Corneal Contact Lens Fitting* said: "No optometrist will read this without gaining many useful tips which he can incorporate into his day-to-day practice of optometry....Reading this book one gets the impression that Vodnoy is a perceptive clinician."⁵ A review of the third edition noted that the book was "hardly a model of textbook production, but that the practitioner who would read through the book could not help but pick up enough valuable clinical tips to make the purchase of this book worthwhile."⁶

Soon after retiring from practice, Vodnoy sold Bernell Corporation to a non-optometric group. After it later ran into financial difficulty, it was purchased by an optometric group in 1997. The company was rebuilt through the efforts of Charles Shearer and Craig Andrews, who were classmates in the Indiana University School of Optometry Class of 1979. Bernell is now once again a leader in the distribution of vision therapy equipment.

Throughout his optometric career, Vodnoy maintained a busy lecture schedule, making presentations to optometric groups and optometry students in more than forty states and more than ten countries.^{3,7} In 1950, he received the honorary Doctor of Ocular Science degree from Northern Illinois College of Optometry, and in 1971, he received the Distinguished Service award from the Indiana Optometric Association.¹ Late in his life he frequently lectured on nutrition and vision.² Vodnoy died at the age of 92 on November 16, 2006.

References

1. Directory of the American Optometric Association. St. Louis: American Optometric Association, 1972:363.
2. Bernell catalog. 2004:75.

3. Professional biography of Bernard E. Vodnoy, O.D., D.O.S., F.A.A.O. In: Vodnoy BE. *The Practice of Vision Care, Orthoptics and Corneal Contact Lens Fitting*, 4th ed. modified. 1972.

4. WorldCat online library catalog. <http://newfirstsearch.oclc.org>. Accessed February 25, 2013.

5. Hirsch MJ. Book review: *The Practice of Vision Care, Orthoptics and Corneal Contact Lens Fitting*. *Am J Optom Arch Am Acad Optom* 1967;44:604-606.

6. Hirsch MJ. The optometrists' bookshelf. *Am J Optom Arch Am Acad Optom* 1969;46:960-963.

7. Dr. Bernard E. Vodnoy obituary. *South Bend Tribune*. <http://articles.southbendtribune.com/2006-11-19>. Accessed February 14, 2013.

Miscellany

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

School of Optometry, Indiana University, Bloomington, IN 47405, dgoss@indiana.edu

Illinois College of Optometry's Predecessor Schools and World War II

The Spring, 2013 issue of *ICO Matters* has an article on some experiences of a few of their alumni in World War II.¹ The involvement of the United States in World War II lasted from 1941 to the war's end in 1945.

Illinois College of Optometry was formed in 1955 from the merger of Northern Illinois College of Optometry (NICO) and Chicago College of Optometry (CCO). Before 1949, Chicago College of Optometry had been known as Monroe College of Optometry (MCO).

The enrollments of NICO and of MCO/CCO were like those of many other optometry schools around World War II – a drop during the war, an increase after the war as returning servicemen attended school on the G.I. Bill, and then a decrease again as that wave of students declined. For example, the approximate enrollment at NICO went from 700 in 1938 to only 60 in 1944 and then to 2,100 in 1947. But then NICO enrolled only 80 new students in the fall of 1950.

At MCO, there hadn't been a graduating class of more than 40 until after the war. In 1948, more than 500 students were attending MCO on the G.I. Bill. There were 480 graduates at MCO in 1947, and that declined to 94 at CCO in 1954.

Daniel Nast, Jr., who graduated from MCO in 1942, enlisted in the Army Air Corps in 1942. There was no classification of optometrists in the Army at the time, but Nast was able to get himself transferred to Sheppard Field Station Hospital in Wichita Falls, Texas, where he served in a clinic with three other optometrists. Their equipment consisted primarily of a retinoscope, a trial frame, and a trial case. Later he served as the lone optometrist at Los Alamos, New Mexico, where the Manhattan Project work on the atomic bomb was being done.

Floyd Mizener (an OHS member!) was in the Marines in World War II. He said that he traveled 87,000 miles on the oceans and loaded big guns with 54 pound shells. He decided to be an optometrist after the war and attended MCO on the G.I. Bill, graduating in 1948. He said that he wasn't able to save any money in the military, but because of the G.I. Bill it cost his father only about \$50 for him to become an optometrist.

Ben Chikairishi was one month short of graduation from optometry school at University of California Berkeley in 1942 when he reported with his family to an internment camp in Arkansas for Americans of Japanese descent. Chikairishi was

released in 1943 and finished optometry school at MCO in 1944. Also at that camp was Roy Teshima who graduated from NICO in 1946.

Bradie Hopper was a dental technician in the Army's 65th Quartermaster Battalion, an all-African American unit. He had completed three years of college at Prairie View University in Texas when he went into military service at 19 years of age. He was on an island in the Pacific when the atomic bomb was dropped on Hiroshima. He said that: "As a young man, 20 years of age, it was a relief. Because that meant the war was ending, and that all the killing... would cease." Hopper graduated from CCO in 1950.

Are there any *Hindsight* readers who can offer recollections of that time in history? Or do you know optometrists who can relate their experiences of that time?

Blindness of Johann Sebastian Bach

An article in *Acta Ophthalmologica* had some speculations about the blindness of composer Johann Sebastian Bach (1685-1750).² From 1723 to his death, Bach was teacher and music director at St. Thomas' Church in Leipzig. Among his duties was composing music for Sunday services.

At 64 years of age, he started having vision problems. Friends persuaded him to have couching operations on his eyes by British traveling eye physician John Taylor. Taylor also operated on Georg Friedrich Handel (1685-1759) who, like Bach, was blinded.

Taylor operated on Bach in late March of 1750 and again in early April. Bach was blind and suffered great pain after the second operation. Bach died in July of 1750. The author suggested that the cause of the blindness was intractable glaucoma due to pupillary block from the lens or perhaps phacoanaphylactic endophthalmitis.

Early history of keratoconus

The March, 2013 issue *Clinical and Experimental Optometry* contains a number of articles on keratoconus. One of the articles tries to sort out descriptions of keratoconus before John Nottingham's 1854 work on the subject.³ Nottingham is often "cited as the first author to succinctly define keratoconus and its associations." Some of the confusion over precedents to Nottingham's description come from the fact that keratoconus was referred to by many different terms.

Benjamin Duddell, who was born in 1695 and died sometime between 1759 and 1767, may have given the earliest written description of keratoconus in a 1736 treatise when he wrote about a 14 year old boy with corneas "like obtuse cones." Descemet's membrane was earlier known as Duddell's membrane.

John 'Chevalier' Taylor (1708-1772), the same Taylor discussed above regarding the blindness of Bach, gave a description of keratoconus in 1766. Taylor was thought a

quack and charlatan by some of his contemporaries, but was thought to be a great ophthalmologist by others.

Burkard David Mauchart (1696-1751) wrote papers on topics related to many fields of medicine. There is some controversy over whether his papers on corneal diseases include a description of what could be considered to be keratoconus.

The paper also documents mentions of keratoconus in works in the first half of the nineteenth century by Scarpa, Wardrop, Lyall, Adams, MacKenzie, Lawrence, Schmidt, Pickford, and von Ammon. Of these latter writers, the authors discussed William MacKenzie the most. MacKenzie included four pages on keratoconus in his 1830 book *Practical Treatise on the Diseases of the Eye*, which “was the first major comprehensive textbook (831 pages) written in English” and which “became a standard international text in various editions and translations for the next 30 years.”

References

1. Engstrom E. ICO & WWII. *ICO Matters* 12(1):7-12.
2. Tarkkanen A. Blindness of Johann Sebastian Bach. *Acta Ophthalmologica* 2013;91:191-192.
3. Grzybowski A, McGhee CNJ. The early history of keratoconus prior to Nottingham's landmark 1854 treatise on conical cornea: a review. *Clin Exp Optom* 2013;96:140-145.

Some Personal Recollections Related to the History of the Defocus Theory of Myopia Etiology

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

School of Optometry, Indiana University, Bloomington, IN 47405, dgoss@indiana.edu

Throughout the years there have been numerous hypotheses proposed to explain the association of nearwork and myopia. Perhaps most prominent today among the potential explanations for that association is the defocus theory, in which defocus of the retinal image is thought to provide a feedback signal for ocular growth and thus axial elongation of the eye. According to this theory, greater axial elongation and thus myopia would occur if a high lag of accommodation existed for long periods of reading.¹

I attended optometry school at Pacific University, graduating in 1974. Pacific provided a strong background in binocular vision and functional aspects of vision. After optometry school, I worked briefly for two optometrists in northwestern Iowa. Their practice had been in existence for 27 years by the time I started working there. I saw many myopic patients that had been examined several times previously, and I observed the regular myopia progression from the records of their prior visits. That stimulated my interest in myopia, and I used records from that office and several others to try to characterize typical features of myopia progression.²⁻⁵

I started graduate school in physiological optics at Indiana University in 1976. When I mentioned to Rogers Reading, the head of the graduate program, that one of my interests was myopia, I was told that Henry Hofstetter was interested in myopia and that I should talk to him about a potential project. I was fortunate enough to have him take me on as one of his thesis advisees.

Henry Hofstetter was the first person that I heard hypothesize a connection of lag of accommodation to myopia etiology. That was in 1976. He had observed that juvenile myopes had large increases in their myopia, but juvenile hyperopes had fairly stable refractive error.⁶ He hypothesized that the factor that might be responsible for that difference is that hyperopes could always have a small lag of accommodation at all distances if they were uncorrected or undercorrected, but myopes would not have a lag of accommodation for at least part of the time. Myopes would not have a lag at far if they were uncorrected, undercorrected, or even fully corrected. He hypothesized that a small lag might in some way provide feedback indicating that growth to elongate the eye was not needed. This was the hypothesis behind my Ph.D. thesis research, which was completed in 1980 and published in 1984.^{7,8}

In the late 1970s and early 1980s, there were several reports of myopia resulting from obstruction of normal visual input into the eye.⁹⁻¹² These reports and laboratory studies showed that visual input in some way directed emmetropization.¹³⁻¹⁵

Hofstetter's hypothesis differed from the current concept of the defocus theory, which suggests that persons who do a lot of nearwork and have a high lag of accommodation at near have a tendency to develop myopia. When a high lag of accommodation exists during near viewing, the point of best focus is behind the retina. As a consequence of such a defocus, the eye could grow longer to move the retina closer to the point of best focus. An advantage of the theory is that it would also explain emmetropization. Rather than suggesting that myopia is a deviation from emmetropization, myopia would essentially be an emmetropization for near.

The first person that I heard postulate this defocus theory was my colleague at Northeastern State University (NSU) College of Optometry, Gary Wickham. Gary earned an M.S. degree from Colorado State University in fisheries science in 1967 and a Ph.D. in zoology from Washington State University in 1971. He held positions in ophthalmology departments at the University of Florida and University of California at San Diego before going to NSU when the optometry school started there in 1979. Among his duties at NSU was teaching ocular anatomy and physiology to optometry students.

I joined the faculty at NSU in 1980. Gary and I had frequent informal discussions on myopia, and he posed the idea to me of myopia being a response to retinal image defocus during reading in the early to mid 1980s. Raviola and Wiesel¹⁶ were the first to my knowledge to present a defocus theory for myopia in print, in a paper in the *New England Journal of Medicine* in 1985. Gary Wickham published a more detailed description of a defocus theory in 1986 in an obscure publication of a symposium on theoretical and clinical optometry we held at NSU.¹⁷

Wickham's 1986 paper, which is written from a basic science standpoint, is to my knowledge, the first elaboration of how acceleration of posterior segment growth might result from a series of biochemical events initiated by retinal defocus. Gary pointed out that accommodation is a short term strategy for near viewing while myopia could be seen as a long term strategy for near viewing if accommodation was inadequate. I published a detailed description of the defocus theory from a clinical standpoint in another obscure publication, that of a Vision Science Symposium held in 1988 at Indiana University.¹⁸ We also briefly discussed the defocus theory as part of a 1988 literature review on genetic factors in myopia.¹⁹

Starting in the early 1990s, many authors elaborated a defocus theory for myopia in various books and journals.²⁰⁻²³ It seems likely that it is an idea that started occurring to lot of investigators independently at about the same time. In the mid 1990s, I worked on two extensive literature reviews discussing the defocus theory for myopia, one discussing the literature showing differences in accommodative function between myopes and non-myopes,²⁴ and one with Gary Wickham discussing the possible mechanism and observations consistent with the hypothesis.¹⁵ There is now an extensive literature in laboratory and clinical studies that have examined the defocus theory, described observations consistent with it, or tried to identify the mechanisms by which it may drive refractive development.²⁵⁻³³

If the defocus theory is someday proven to be the correct explanation for the association of nearwork with childhood myopia progression, it will be interesting to see who will be given credit for the theory. It will probably be the person who publishes the best experimental evidence in the most widely read journal. However, I will always feel that it was my friend Gary Wickham who had the idea first.

References

1. Goss DA. Nearwork and myopia. *Lancet* 2000;356:1456-1457.
2. Goss DA, Winkler RL. Progression of myopia in youth: age of cessation. *Am J Optom Physiol Opt* 1983;60:651-658.
3. Goss DA, Erickson P, Cox VD. Prevalence and pattern of adult myopia progression in a general optometric practice population. *Am J Optom Physiol Opt* 1985;62:470-477.
4. Goss DA, Cox VD. Trends in the change of clinical refractive error in myopes. *J Am Optom Assoc* 1985;56:608-613.
5. Goss DA. Variables related to the rate of childhood myopia progression. *Optom Vis Sci* 1990;67:631-636.
6. Hofstetter HW. Some interrelationships of age, refraction, and rate of refractive change. *Am J Optom Arch Am Acad Optom* 1954;31:161-169.
7. Goss DA. The effect of overcorrection of myopia on its rate of increase in youth. Ph.D. thesis, Indiana University, 1980.
8. Goss DA. Overcorrection as a means of slowing myopia progression. *Am J Optom Physiol Opt* 1984;61:85-93.
9. Robb RM. Refractive errors associated with hemangiomas of the eyelids and orbit in infancy. *Am J Ophthalmol* 1977;83:52-58.
10. O'Leary DJ, Millodot M. Eyelid closure causes myopia in humans. *Experientia* 1979;35:1478-1479.
11. Hoyt CS, Stone RD, Fromer C, Billson FA. Monocular axial myopia associated with neonatal eyelid closure in human infants. *Am J Ophthalmol* 1981;91:197-200.
12. Rabin J, Van Sluyters RC, Malach R. Emmetropization: a vision-dependent phenomenon. *Invest Ophthalmol Vis Sci* 1981;20:561-564.
13. Wallman J, Turkel J, Trachtman J. Extreme myopia produced by modest change in early visual experience. *Science* 1978;201:1249-1251.
14. Wildsoet CF. Active emmetropization – evidence for its existence and ramifications for clinical practice. *Ophthalm Physiol Opt* 1997;17:279-290.
15. Goss DA, Wickham MG. Retinal-image mediated ocular growth as a mechanism for juvenile onset myopia and for emmetropization – a literature review. *Documenta Ophthalmologica* 1995;90:341-375.
16. Raviola E, Wiesel TN. An animal model of myopia. *New England J Med* 1985;312:1609-1615.
17. Wickham MG. Growth as a factor in the etiology of juvenile-onset myopia. In: Goss DA, Edmondson LL, Bezan DJ, eds. *Proceedings of the 1986 Northeastern State University Symposium on Theoretical and Clinical Optometry*. Tahlequah, OK: Northeastern State University, 1986:117-137.

18. Goss DA. Retinal image-mediated ocular growth as a possible etiological factor in juvenile-onset myopia. In: Vision Science Symposium: A Tribute to Gordon Heath. Bloomington: Indiana University, 1988:165-183 (available at: <https://scholarworks.iu.edu/dspace/handle/2022/9037>), Accessed March 21, 2013.
19. Goss DA, Hampton MJ, Wickham MG. Selected review on genetic factors in myopia. *J Am Optom Assoc* 1988;59:875-884.
20. Schaeffel F, Troilo D, Wallman J, Howland HC. Developing eyes that lack accommodation grow to compensate for imposed defocus. *Vis Neurosci* 1990;4:177-183.
21. Troilo D, Wallman J. The regulation of eye growth and refractive state: an experimental study of emmetropization. *Vision Res* 1991;31:1237-1250.
22. Gwiazda J, Thorn F, Bauer J, Held R. Myopic children show insufficient accommodative response to blur. *Invest Ophthalmol Vis Sci* 1993;34:690-694.
23. Abbott ML, Schmid KL, Strang NC. Differences in the accommodation stimulus response curves of adult myopes and emmetropes. *Ophthal Physiol Opt* 1998;18:13-20.
24. Goss DA, Zhai H. Clinical and laboratory investigations of the relationship of accommodation function with refractive error – a literature review. *Documenta Ophthalmologica* 1994;86:349-380.
25. Hung G, Ciuffreda KJ. Model of human refractive error development. *Curr Eye Res* 1999;19:41-52.
26. Smith EL III, Hung L-F, Harwerth RS. Developmental visual system anomalies and the limits of emmetropization. *Ophthal Physiol Opt* 1999;19:90-102.
27. Chen JC, Schmid KL, Brown B. The autonomic control of accommodation and implications for human myopia development: a review. *Ophthal Physiol Opt* 2003;23:401-422.
28. Morgan IG. The biological basis of myopic refractive error. *Clin Exp Optom* 2003;86:276-288.
29. Hung GK, Ciuffreda KJ. An incremental retinal-defocus theory of the development of myopia. *Comments Theoret Biol* 2003;8:511-538.
30. Wallman J, Winawer J. Homeostasis of eye growth and the question of myopia. *Neuron* 2004;43:447-468.
31. Harb E, Thorn F, Troilo D. Characteristics of accommodative behavior during sustained reading in emmetropes and myopes. *Vision Res* 2006;46:2581-2592.
32. Charman WN, Radhakrishnan H. Peripheral refraction and the development of refractive error: a review. *Ophthal Physiol Opt* 2010;30:321-338.
33. Charman WN. Myopia, posture and the visual environment. *Ophthal Physiol Opt* 2011;31:494-501.

Optometric Historical Society Membership Application

Membership in the Optometric Historical Society (OHS) is open to anyone interested in the history of optometry, spectacles, vision science, or related topics. Membership includes a subscription to *Hindsight: Journal of Optometry History*.

To join OHS, send your address and a check for dues payment to:

Optometric Historical Society
Attn: Rebecca Hildebrand
American Optometric Association
243 North Lindbergh Boulevard
St. Louis, MO 63141

Check one:

_____ regular membership, \$25 per year

_____ patron membership, \$50 per year

_____ lifetime membership, \$250

Checks should be made payable to the Optometric Historical Society.

Name _____

Address _____

A sample copy of *Hindsight: Journal of Optometry History* can be obtained by writing to the journal editor: David A. Goss, Hindsight Editor, School of Optometry, Indiana University, Bloomington, IN 47405; dgoss@indiana.edu or can be viewed at www.opt.indiana.edu/ohs/hindsightJan07.pdf.

Institutional or library subscriptions to *Hindsight: Journal of Optometry History* can be obtained by following the above instructions for registering OHS membership and completing the above OHS membership application form.

Members of the Board of Directors of Optometry's Cares™ – The AOA Foundation and the Optometric Historical Society (OHS) have signed a Memorandum of Understanding that places OHS under the auspices of The AOA Foundation. For more information about The AOA Foundation and the Optometric Historical Society, please visit www.optometrycharity.org and www.opt.indiana.edu/ohs/optohiso.html.