

# Introduction

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— *Those who cannot remember the past are condemned to repeat it.*

George Santayana *The Life of Reason*

**A**lthough “optometry” is a uniquely American invention, the profession’s antecedents reach back to antiquity and to the science of optics.

The early Greeks possessed some knowledge of optics; Plato, Aristotle, and Euclid all wrote about it.

Plato’s comments on optics date back to 400 bc. Aristotle seemed familiar with what we know today as myopia. Archimedes discovered the relationship between a sphere and a cylinder. He was aware of the importance of this discovery, attested to by the fact that he directed that a sphere and a cylinder be engraved on his tombstone. Archimedes was the ingenious Greek who destroyed the Roman fleet by the use of burning mirrors.

Ptolemy of Egypt knew and wrote about refraction in the second century. He wrote 13 volumes on the refraction of light and the function of vision. In the 11th century, Alhazen, an Arabian philosopher, wrote about the anatomy of the eye and about optics.

The Chinese claim that the use of spectacles began in China in very ancient times. However, the Englishman Roger Bacon (Figure 1) was the first to write about convex lenses for presbyopia (“old sight”), describing their use in 1276. He may have invented the use of lenses for near vision. Allasandre de la Spina, an Italian monk, is credited with “perfecting spectacles”; however, an inscription on the tomb of Salvino D’Armato (in 1317, the date of his death) credits him with the invention. Actual credit therefore is uncertain, but spectacles appeared in Europe sometime between 1275 and 1285.

The clinical application of the science of optics began in Europe. Christopher Scheiner, a Jesuit priest, is often called the “Father of Optometry.” He described the vision of myopic individuals in 1625.

The ancestors of optometrists in the United States are the European opticians who, like other skilled craftsmen of the time, organized themselves into guilds. The origin of the guilds is lost in the history of the Dark Ages. It is certain that originally guilds were organizations of congenial people, tied together by some common activity or background, for the purpose of ensuring that fellow members received a Christian burial when they died and that their widows and orphans received adequate care. In the 11th and 12th



FIGURE 1 Etching of Friar Roger Bacon, by William H.W. Bicknell, after a painting by Howard Pyle. (Reprinted with permission from the New York Public Library, New York.)

centuries, the possibility that a loved one might spend eternity in purgatory unless that person received proper death rites was a predominantly Christian Europe.

In time, the common activity that bound members of guilds together became more and more important and led to the establishment of craft guilds in the 14th and 15th centuries. These guilds set up standards and price controls for their products, to which each guild member had to adhere. They also set up an educational system so that the skill of the craft could be continued from year to year and to maintain a limit on the number of skilled men in that craft. One learned a craft by first becoming an apprentice to a master. The number of apprentices each master could have was limited. The length of time and the condition of servitude as an apprentice were carefully established. When the apprenticeship was successfully concluded, the worker became a journeyman. His skill was attested to by the guild. As a journeyman, he had some freedom of employment and under

certain conditions could change from one master to another. After serving as a journeyman for a definite period, a skilled craftsman could present his masterpiece to the guild. If it was accepted and approved, he became a master and could establish his own shop.

Apparently the first separate spectacle makers' guild was established in France in 1465; the second was begun in Germany in 1577. This does not mean that there were no spectacle makers before this time but merely that spectacle makers were members of other guilds. An example of such a guild was the Worshipful Company of Spectacle Makers, an English guild chartered by King Charles I in 1629 (Figure 2). opportunity so that the graduate will not be forced to choose a less-thandesirable beginning.

In April 1628, Robert Alt, citizen and brewer, in concert with 15 other London Spectacle Makers—12 of whom were members of the Brewers' Company—petitioned the King in Council for a charter of incorporation. This petition reads, in part:

"To the Kings Most Excellent Majesty: The humble petition of Robert Alt on behalf of himself and other poor spectacle makers in and about the City of London.

Most humbly shewing: That whereas the mystery of making spectacles hath been and still is of good esteem and repute as well in foreign parts beyond the seas as within this Your Majesty's Realm of England: and daily doth increase; and many who have served as Apprentices thereunto; and others who have remained some small time apprentices and afterwards departed from their Masters service; having by indirect and private means attained unto some small insight of the same profession, Do now use many deceits in the said mystery in making and uttering bad and hurtful wares whereby Your Majesty's subjects are not only merely cosened, but sometimes much prejudiced; and Your Petitioners who have



FIGURE 2 Coat of Arms of the Worshipful Company of Spectacle Makers, found in the Crypt, Guildhall, London. (Reprinted with permission from CJ Eldridge: The Worshipful Company of Spectacle Makers. *J Am Optom Assoc* 50[4]:481-487, 1979.)

served seven years apprenticeship to the same profession and are good true workmen (of whom some are charged with wives and children) much wronged in their credit, their profession vilified, and they thereby almost utterly undone, unless Your Majesty's gracious favor be extended towards them for their relief herein. In tender consideration whereof and forasmuch as all such trade mysteries and manufactures are incorporated into a body politic do still subsist in a comely and commendable manner and those subject to no certain ordinances, rules or government are found by experience to be in short time utterly subverted. And for that your Petitioners conceive a Corporation amongst them to be a means for redress of these their grievances."

It is apparent that little of this petition would need changing to make it suitable for placement on the agenda of an American Optometric Association (AOA) meeting.

The charter granted to "The Master Wardens and Fellowship of Spectacle Makers of London" gave the company very broad powers. It established a means of government for the company, allowed the company to establish standards, and set up search and seizure provisions for substandard spectacles and for the punishment of those violating any of the rules set down by the company.

Generally, persons became members of the guild by servitude through apprenticeship. However, sons of members could become members directly by patrimony. Later on, certain individuals were allowed to purchase membership, called redemption. During the 15th century, both on the continent of Europe and in Great Britain, it was almost essential that a craftsman of any kind be a freeman of the city in which he practiced his craft. The only way a person could be a freeman of the city was to obtain this status through membership in a guild. Therefore, before the Worshipful Company of Spectacle Makers was formed, spectacle makers had to be members of some other guild. A nucleus was found in the Brewers' Company, probably through the action of the law of patrimony. It is known that the father of Robert Alt, for example, was a member of the Brewers' Company.

As the number of journeymen increased and as knowledge regarding the mysteries of the various crafts spread, the guilds began to lose power; eventually, their ability to control their craft was lost. The guilds in Great Britain gradually became largely social institutions, until near the close of the 19th century, when the old companies began again to take an interest in regulatory activities. The spectacle makers established an examination that ophthalmic opticians could take voluntarily. Those who passed the examination became members of the company, but—more important—their competency was attested to by the Worshipful Company of Spectacle Makers.

Much of the craft background in spectacle making was lost by the craft's mere transfer from Europe to America. In the US, spectacles were sold primarily by travelling eyeglass salesmen, with customers selecting their own glasses by trial and error while selecting from multiple pairs of glasses from a suitcase full of spectacles. Refractive testing of the eye did not make its appearance as a scientific application of optics until the 19th century. The primary advances occurred in Europe.

In the early 1800s the English scientist Thomas Young (Figure 3) discovered astigmatism; in 1827 Sir George Beddell Airy, an English astronomer, measured the astigmatism in his own eyes and had a cylindrical lens ground.

In 1843, Christoph Frommüller of Germany invented the trial lens case, making possible the use of subjective examination and the creation of custom-made spectacles. Edward Jaeger, in 1854, published his reading card. In the middle of the 19th century the principles of skiascopy (retinoscopy) were discovered and explained, and in the latter part of the century, Hermann Snellen (Figure 4) invented his squared test type. Another key event was the invention of the direct ophthalmoscope by Hermann von Helmholtz in 1850.



FIGURE 3 Thomas Young. (Reprinted with permission from CG Mueller, M Rudolph: Light and Vision. New York, 1966, Time.)

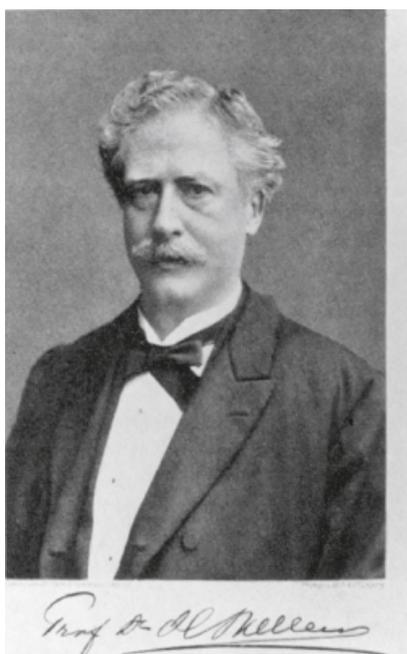


FIGURE 4 Hermann Snellen. (Reprinted from *Graefe's Archives of Ophthalmology* 667[3]:379, 1980.)

Medicine entered the field around 1860, with the Dutch physician Frans Donders publishing his seminal book, *On the Anomalies of Accommodation and Refraction of the Eye*, in 1864. Until this time, eye physicians—called oculists—opposed the fitting of spectacles except for "old sight." Oculists began to take an interest in refraction during the late 1800s, and it was urged by some that the important matter of fitting glasses should not be left to opticians. The jealousies that were started then have yet to be outlived.

During the middle of the 19th century, American companies began to produce lenses and frames on a large-scale basis; leading companies included American Optical, Bausch & Lomb, and Shuron. Some of these early manufacturers set up training courses for medical and nonmedical refractionists as a means of boosting the sales of their frames and lenses. Courses ran from 1 to 2 weeks, with the awarding of a goldembossed certificate at graduation.

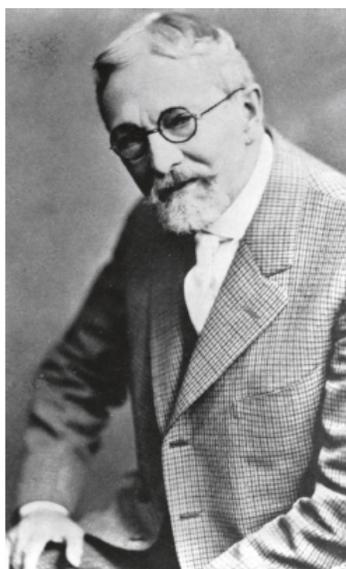
Early courses in refraction were a far cry from those found in today's professional curricula. One of the most advanced courses was given by the Northern Illinois College of Ophthalmology and Otology in 1895; it required 3 months. The Johnston Optical Institute offered four courses, each complete in itself, and maintained that all four together constituted "a university course of instruction in optics" that taught "everything up to the use of the ophthalmoscope." The Klein Optical School (the present New England College of Optometry) had a tuition fee of \$25 for the full term. In June 1896, Dr. Theodore F. Klein announced a course of lectures to be given in a tent in a pine grove at the edge of a lake near his summer home. A camping outfit could be purchased for \$10, and fish and berries were plentiful, so the students could bring their families while incurring very little expense in their quest to become refracting opticians.

As in medicine, numerous correspondence courses were available, and diplomas were awarded on successful completion of the course of study.

Despite these shortcomings, by the close of the 1800s, refracting opticians had become firmly established as technical experts who were providing a needed and previously neglected service required by modern civilization. The medical profession had almost completely ignored and even opposed this necessary service.

Charles F. Prentice (Figure 5) has been called the "Father of Optometry" in the US. He was a mechanical engineer, optician, and refractionist. He led the fight for the legal recognition of optometry in New York. His efforts were based on the conviction that the refractive services of the time were entirely inadequate, that the refractionists—both medical and nonmedical—were in general incompetent, and that it was necessary to establish a professional group separate from medicine to take care of the needs of the public in the field of vision care.

That modern optometry's career has always been attended by controversy is not at all surprising for the profession was born in controversy. In 1892 Prentice referred a patient to



**FIGURE 5** Charles Prentice. (Reprinted from CF Prentice: *Legalized optometry and memoirs*. Seattle, 1926, Casperin Fletcher Press.)

Henry D. Noyes, MD, a leading ophthalmologist and otologist in New York City, for care of an inflammation of one eye. Noyes sent Prentice a letter, ostensibly thanking him for the referral, but in fact reprimanding him for having charged the patient a fee for refractive services in addition to the charge for glasses. Noyes held this to be a serious matter, one that would antagonize the oculists, since they would consider Prentice's actions to have put him in competition with them. Noyes further objected that, by charging for services, Prentice would cause the public to assume that he had the qualifications that entitled him to a fee for advice.

The controversy gained momentum, and the New York Medical Society agreed to adopt a resolution to expel any member who would send patients to opticians for a refraction. When Prentice and his colleagues submitted to the New York Legislature a bill to regulate the practice of optometry in the state, the medical society vigorously opposed it, ensuring that it would not pass.

Despite the bill's defeat, the idea of legislative recognition caught on among optometrists, and in 1901 Minnesota became the first state to enact an optometry law. After 12 years of continuous effort, led by Andrew J. Cross and Prentice, in 1908 the New York Legislature passed an optometry law. The last jurisdiction, the District of Columbia, completed the "legalization" of optometry by enacting a law in 1924. The many arguments put forth by Prentice and his colleagues during these legislative struggles are well worth reading and are as valid today as they were a century ago.

Before 1903, the AOA was known as the American Association of Opticians, an organization that included in its membership both refracting opticians (the precursors of optometrists) and dispensing opticians (known today as "opticians"). By 1903, however, the dispensing opticians had separated from the organization, and it

became necessary to find a name for the refracting opticians. In 1904 the terms "optometry" and "optometrist" were adopted and a campaign was started to popularize them. In 1919 the organization changed its name to the American Optometric Association.

With the advent of the optometry laws, schools and colleges of optometry were chartered to provide students with the education and training necessary to meet the requirements set forth in these laws for the practice of optometry. Standards continued to improve as optometry elevated itself through education, organized legislative efforts, and the adoption of codes of practice and codes of ethics.

Today, optometry in the US has reached a position of recognition and acceptance that is closely equaled only in Britain, Australia, and Canada. Optometry is recognized as a health care profession in all US states and by agencies of the federal government. Use of ophthalmic drugs by optometrists is approved in all states. Optometrists and ophthalmologists work together in schools, multidisciplinary clinics, the military, referral centers, and private practice. Interprofessional referrals between members of the two disciplines have become common. Despite the professional jealousies and political differences between the two professions, they have in fact come to more closely resemble one another, with optometry emerging as the provider of primary care and ophthalmology continuing to emphasize training for secondary and tertiary care. In fact, the difference between the two in most states in which optometrists treat glaucoma and the majority of ocular disease is simply that optometrists, unlike ophthalmologists, are not trained to perform other than the most basic surgical procedures.

Today, optometrists can best be defined as the primary health care professionals for the eye. Optometrists examine, diagnose, treat, and manage diseases, injuries, and disorders of the visual system, the eye, and associated structures, as well as identify related systemic conditions affecting the eye.

Optometrists render a vital service that was borne of medicine's refusal to recognize the widespread public need for refractive care. The profession has always acknowledged an obligation to examine for pathologic factors when rendering this care, an obligation that now includes the treatment of pathologic conditions. Optometrists have every right to be proud of the unique heritage that has led to this combination of knowledge and skills. Optometry cannot be considered a restricted form of ophthalmology; it is a primary health care profession with its own body of knowledge and with unmatched expertise in the area of vision care.

Today's optometry school graduates receive an enlightened and unexcelled education in vision science and in the art and science of health care. Optometry's position that the dispensing of ophthalmic materials is an integral part of this care and is best performed by the practitioner who has examined the patient has withstood the test of time. Even so, emphasis on health care services continues to grow, challenging practitioners to maintain an adequate balance between the traditional refractive services of the past and the health care services of the future. Graduates who seek to enter the practice of optometry

will find career choices significantly affected by this dichotomy in services. Some career opportunities will emphasize the sale of ophthalmic materials, with vision and health care services minimal and incidental to the sale; others will emphasize eye and vision care services, with little or no attention paid to the dispensing of ophthalmic materials; and still others will offer a balance between the two skills. Graduates must choose between these options, which are the hallmark of a free-enterprise system. The challenge for optometric educators is in ensuring that graduates of optometry school are knowledgeable with regard to the variety of ophthalmic materials (spectacle lenses and contact lenses), refractive skills, and

health care services (pathologic and diagnostic) and in ensuring that they understand the importance of maintaining an adequate balance between those skills in providing for their patients.

It is the intent of this book to explore some of the vital issues necessary to the making of these choices and to consider the alternative ways by which graduates may engage in the practice of optometry. In so doing, it is hoped that graduates will be better able to meet their responsibilities to the public and to more adequately serve the health care needs of our country.

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