2. Common Origins of The Institute of Optics and the Optical Society of America

Susan Houde-Walter

In the early nineteenth century optical instrument makers were almost entirely based in Europe. This was the age of the simple landscape camera lens and the first achromatic microscopes. There were optical designers, but the theory of imaging was primitive. Real glasses had to be begged from glaziers and refractive indices were largely unknown, as were curvatures. Instrument makers used trial and error and jealously guarded and copied each other’s designs. The situation was radically improved by a multi-decade, interdisciplinary collaboration between Carl Zeiss, Ernst Abbe, and Otto Schott in Jena, Germany. Together they developed and applied diffraction imaging theory, glasses to correct secondary spectrum, and many precepts of sound optical design and testing. By the 1860s, Germany became a hotbed for optics manufacture, particularly microscopes.

John Jacob Bausch was a German optician's apprentice who decided in 1850, at twenty years of age, that he could have a better life in America. He headed for New York City on a forty-nine-day boat journey and from there made his way to Buffalo, New York. There was a cholera epidemic in Buffalo, and he could not find any work in any event. The employment scene was not much better in Rochester, but he managed to survive for a few years, whereupon he decided to open a spectacle shop of his very own. Unfortunately, most Americans did not use spectacles. His business languished, but he was helped by a German-born friend, Henry Lomb, who joined him and contributed his own earnings to the Bausch family. After the Civil War, spectacles became better accepted, business improved, and “Bausch & Lomb, Inc.” expanded into instrument making. The improvements in German microscope design encouraged them to hire a microscope maker from Berlin named Ernst Gundlach. Photographic lenses were next, and soon after, Bausch & Lomb became the exclusive American manufacturer of anastigmas for Zeiss.

Rochester in the 1880s had small optical companies bubbling up all over. Mr. Gundlach apparently did not get along well with management at B&L and was involuntarily retired a few years after his hire. He and a schoolteacher friend started an optical goods store operating from their home, just down the street from the B&L factory. Their company moved several times, but was known to produce microscopes and objectives. Gundlach himself eventually left that company to start another company in the same business. Wollensak and Ilex were also started by former B&L employees to make photographic shutters, in 1882 and 1910, respectively. In the meantime, the original Gundlach company bought the Korona camera lens company to expand its product line. Later, the company bought the Manhattan Optical Co. and occupied 761 South Clinton Avenue. That address was also occupied by the Rochester Panoramic Co. (1905), the Seneca Camera Co. (1903–10) and the Ilex Optical Co. (1912–16). Wollensak bought the original Gundlach company in 1905. Meanwhile, William Walker founded the Rochester Optical Co. in 1880 to make photographic cameras. The following year, his brother founded a competing company, Rochester
Camera Manufacturing Co. Three other rival camera companies joined forces with the competing brothers’ companies in 1899 to amalgamate the Rochester Optical & Camera Co. The merger may have been in response to an aggressive newcomer to the optical scene: George Eastman.

Unlike his counterparts, Eastman did not have a technical background. Rather, he was assistant bookkeeper at a local bank, but he was interested enough in his photographic hobby to travel to London to learn how to make gelatin dry plates. He patented a plate-coating machine and opened for business in 1880, making plates at night and working at the bank in the daytime. By 1888 Eastman’s business was strong despite having lost a long patent battle with another optical company over transparent film. Eastman got into camera manufacture, and he acquired Blair Camera, American Camera, and Photographic Materials and moved them into a central location in Rochester.

Several other camera companies were founded in Rochester at that time, including Sunart Photographic Co. (1893), Folmer & Schwing (1887), Gassner & Marx (1898), Vogt Optical (1899), Century Camera Co. (1900), Seneca Camera Co. (1900), Crown Optical Co. (1906), and Rectigraph (1909). Many more were to come.

Throughout this period of expansion in Rochester, applied optics was coming to be recognized as a field of its own. The National Bureau of Standards in Washington, D.C., recognized that it was too big to confine under the aegis of physics, and established an Optics Division in 1903. Perley Nutting joined the bureau the same year. Nutting had just completed his doctorate at Cornell University, but not before he had toured Europe and observed the advanced instrument making and quality of optical glass for himself. Nutting kept up his contacts in Europe when he returned to the United States, and he communicated European advances to others at the bureau. In the several years following Nutting’s hire, the bureau published several circulars on optical instruments and optical properties of materials, including Nutting’s book, *Applied Optics*. Nutting and several colleagues, including the bureau director, S. W. Stratton, met frequently at the bureau to present original work and to discuss optics in general.

By 1910, Nutting had decided to form a formal society for applied optics and to establish a journal of original papers. He wrote to many friends and colleagues in the United States and Europe. Although many shared his sentiment, no action was taken. Shortly afterwards, Nutting moved to Rochester to join the new research lab at Eastman Kodak.

World War I started in Europe in August 1914. The blockade on Germany meant that optical glass was no longer available to the burgeoning optics industry in Rochester. It became immediately clear that more knowledge of optical theory and more advanced instrument-making skills would also be needed in the United States. The existing Rochester groups on microscope making, optometry and the like did not satisfy this need. Consequently, on November 18, 1915, several interested
individuals, including Nutting and Lomb, met in the Physics Library at the University of Rochester to form an optical society. It was named the Rochester Association for Advancement of Applied Optics. Within three weeks, a constitution and by-laws were written and adopted, and first officers and council elected. The first regular meeting was scheduled for Tuesday, January 4, 1916, on the University campus, and every other Tuesday thereafter between October 1 and May 31. (This schedule is still used by the Rochester local chapter.) Ophthalmologists, optometrists, lens designers, physicists and engineers, and photographers were recruited as new members. The formation of the society was announced in several journals, and an average of forty people attended each of the new meetings. Given the obvious interest and need, it was decided one short month later, in February 1916, to plan a national optics society, with the name Optical Society of America. One year later the OSA was well-enough known that the National Research Council approached OSA for lists of optical equipment manufacturers and suppliers to the federal government.

The first order of OSA business was to start the Journal of the Optical Society of America. The first paper in the journal, “Opportunities for Research,” was a broad and heartfelt appeal to the scientific community by F. K. Richtmyer from Cornell University. In it he said that the OSA “should not be content to hold meetings a few times a year and to publish a journal. The opportunities extend far beyond these functions . . . .” He entreated OSA members to identify and promote important topics of investigation, to encourage university research, and he reminded readers that even seemingly minor problems could reveal important discoveries, such as Hertz’s discovery of photoelectricity.

A lens designer at Bausch & Lomb, Herman Kellner, was the first appointed editor for JOSA. Originally trained and practicing in Germany, Kellner was meticulous in his efforts to establish and maintain the highest scientific standards for the journal. Individuals familiar with his efforts reported that many submissions were bottlenecked on his desk while others were rejected as substandard. He and Nutting agreed to set the tone in the first issues as one of highest possible technical quality and original work only. The result was a thin but first-rate journal.

The first regular meeting of the OSA was held on December 28, 1916. There were twelve contributed papers on vision, lens design, image theory, color measurement, light sources, microscopy and glass technology. Eight of the twelve contributions came from industry. The second scheduled meeting was cancelled because of war, but the “third” annual meeting was held in 1918 almost immediately after the war ended. With war very fresh on everyone’s minds, the council considered limiting admittance “in accordance with nationality and residence,” but ultimately decided to keep the meeting open.

Plans for the founding of an “Institute of Optics” were simultaneously afoot at the University of Rochester. It would take eleven more years to come to fruition, but in 1918 Nutting suggested that the Institute of Optics should be intimately involved with publication of JOSA, and oversee a handbook of optics and various reference books on applied optics. It is interesting to note that many OSA officers served on the advisory committee to found the Institute of Optics. Thus the links between OSA and the Institute of Optics were established very early in their respective histories.

Nutting left Rochester to head the research lab at Westinghouse before the first national meeting took place. Nevertheless, he had made indelible marks by founding both the Rochester section of the OSA and the OSA itself, plus contributing to the foundation of the Institute of Optics. OSA has grown enormously since then, as has the optics industry in Rochester and the academic effort at the University of Rochester (witness the Center for Visual Science, the Laboratory for Laser Energetics, the Center for Optics Manufacturing,
the Center for Electronic Imaging Systems, all offshoots of the Institute of Optics). Vestiges of Nutting’s influence can still be seen by the deep commitment students and faculty have to OSA volunteerism and governance of the society. And even as OSA has grown into a truly international society, it may be possible to say that you can take OSA out of Rochester, but you cannot take Rochester out of OSA. Our beginnings are entwined.

Material for this article was drawn from the following three sources: