

1. Rush Rhees and His University: 1900–1930

Hilda Kingslake

Rush Rhees was President of the University of Rochester when The Institute of Applied Optics was founded in 1929. He was then almost at the end of a long and distinguished term of service which began in 1900, when the University was a very small private college restricted to undergraduate teaching in arts and science. In 1900, there were 157 students and 17 on the faculty, and the buildings consisted of little more than Anderson Hall, built in 1861, Sibley Library, built in 1876, and the Reynolds chemistry laboratories, built in 1887—all on what is now known as the Prince Street campus or the “old campus.” The Alumni Gymnasium, also on the Prince Street campus, opened in the fall of 1900. Present-day students and faculty know little about this strong, quiet, circumspect, somewhat stern but kindly Baptist minister from New England, who once taught mathematics and for whom the present University library is named. The story of how, within 10 or 12 years, he found the wherewithal to buy additional land and add several major buildings on the Prince Street campus is well recorded. These were the Eastman Building for physics and biology (1905), Carnegie Building for applied science (1911), the Memorial Art Gallery (1913), and Anthony Memorial and Catharine Strong halls for women (1914).

Experience as a member of the board of directors of the Mechanic’s Institute very soon made Rhees aware of a great need for university-level technological training in the Rochester area. He spent a year-long sabbatical leave in Europe for the specific purpose of investigating facilities for higher education in applied sciences and returned to Rochester with a goal of development for the University very clear in his mind. Again, it has been well recorded how, within another 20 years, he secured the millions of dollars required to transform completely the University; how he established a complete and superior school of music (1924) and a very fine medical school (1925), how he introduced a program of graduate education and a department of engineering in the College of Arts and Science. By 1929, moreover, Rhees had nearly built a complete new campus for men in arts and science due to be dedicated in 1930; he was also augmenting the facilities of the old campus for women students,

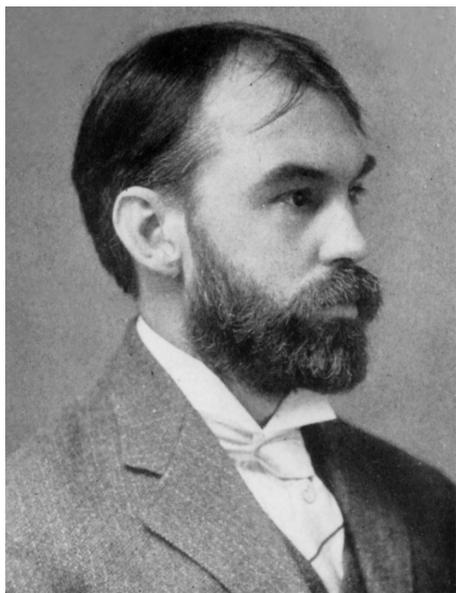


Benjamin Rush Rhees, President of the University of Rochester 1900–1935.



Eastman Building, Prince Street Campus.

who he decided should be educated separately from the men. The opening of The Institute of Applied Optics in the fall of 1929, with only two on the faculty, was to all outward appearances a very minor event indeed, and it is not at all surprising that in the University as a whole this innovation made little, if any impression. However, from its start, the Institute was regularly listed in the University bulletins and was given special attention in the President's Annual Reports to the Trustees for many years. Although the founding of the Institute was well reported in student publications and in the city press, no mention of the founding appears in the hundred-year history of the University; reference is made only to the Institute's part in the war.



James P. C. Southall.

Why did Rush Rhees at this very complex time in University development trouble with this unfamiliar, little understood venture? It was all in keeping with his sincere desire to be of service to the scientific industries and the community of the Rochester area, whence the University derived so much of its support.

In 1910, J. P. C. Southall, at that time a professor at Alabama Polytechnic in Auburn and later Professor of Physics at Columbia University, published a book entitled *Principles and Methods of Geometrical Optics*. In the preface he pleaded for more attention to geometrical optics in particular and to all optics in general. He drew attention to the fact that "the great province of applied optics was almost exclusively German territory, so that nearly all the outstanding developments of modern times in

both the theory and construction of optical instruments are of German origin.” He regretted that English-language books ignored the great German theoreticians.

In 1912, Perley G. Nutting, then at the Bureau of Standards and later at Eastman Kodak Company, published a little book entitled *Outlines of Applied Optics*. In the preface he stated that more texts were urgently needed. He pleaded for more serious teaching of optics, especially applied optics, “usually ignored by students of pure optics.” He was convinced that no richer field awaited the investigator in pure optics than in applied optics, “which presents brainracking and alluring problems” worthy of university teaching and research.

In 1914 Europe was plunged into World War I. The German blockade and the allied counter-defense of the seas very soon affected transoceanic commerce between the United States and Europe. A famine of superior optical instruments and optical glass immediately developed, so that all too soon the truth of Southall’s words came home to both England and the United States.

In 1915, envisioning ultimately the founding of the Optical Society of America, a number of optically concerned members of the Rochester companies and professions established the “Association for the Advancement of Applied Optics,” with every intention of its becoming, as soon as possible, the first local section when the national society should be formed. A year later, in 1916, the National Society was founded.

In 1917, the problem of finding personnel to cope with the often unfamiliar precision optical equipment required by the wartime government became so acute in England and France that, while the war was still in progress, a Department of Applied Optics was opened at the Imperial College of Science and Technology, a college of the University of London. The faculty appointed were experienced and progressive personnel taken from war work in industry and the Ministry of Munitions. Within a year the university-level Institut d’Optique was opened in Paris. In December 1917, Southall, by now a Professor of Physics at Columbia University and teaching more optics than at all usual, published an article in the *Scientific American*, reviewing the progress of advanced education and research in optics that started in London and Paris, he expressed the hope that Columbia might realize the advisability of undertaking a similar program in this country.

On February 6, 1918, Mr. George Eastman addressed the following letter to Dr. Rhees, in reaction to a letter he had received from Professor Southall:

Dear Dr Rhees:

The enclosed letters from Mr. Dey and Professor Southall raise the question in my mind whether Rochester is not the place for a School of Applied Optics instead of New York. If you are interested, I should be glad to arrange for Dr. Mees, Mr. Barnes, and Mr. Dey to go and see you about it.

Since beginning this letter, I called up Mr. Edward Bausch and he says that he had some talk with you about such a project several years ago and that he had not materially changed his attitude toward it which was very favorable.

Yours very truly,
(signed) Geo. Eastman

It must, therefore, have been in 1917, or even in 1916, that Edward Bausch had first approached Rhees. Bausch and his business associate Adolph Lomb, were charter members of the young Optical Society of America, together with Southall and a number of others influential in the field of applied optics. All were imbued with the thought of establishing a university department solely devoted to teaching and research in optics. At the third annual meeting of the Optical Society of America, held at Baltimore in December 1918,

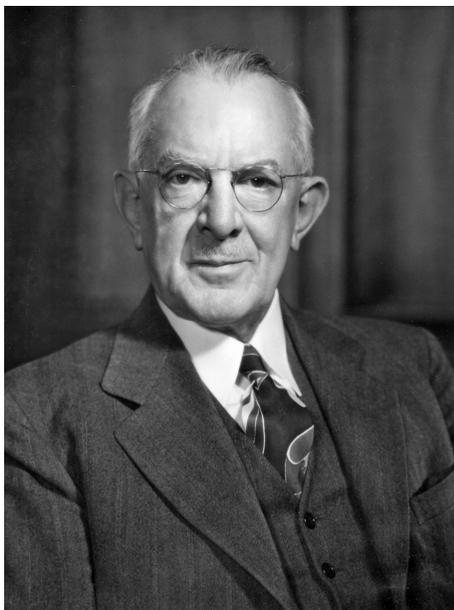
only 10 months after Mr. Eastman's letter to Rhees, the Council referred to "the School of Optical Engineering shortly to be organized in connection with the University of Rochester." At that time, Dr. Rhees had indeed received Mr. Eastman's suggestion very favorably, but he had not yet gone beyond suggesting that the first step would be to find a director. In fact, Rhees was only just beginning to feel his way through preliminary conversations and correspondence.

The years 1920 to 1930 were, of course, the years of greatest change in the whole history of the University to this day. Nevertheless, Rhees revived the 1918–1919 discussions; many relevant and serious questions had to be answered. Almost from the beginning, it was quite agreed that the Institute should be in Rochester at the University. Other decisions were not so easily arrived at. Should the Director be appointed before details of courses and housing of the Institute were decided? Who should be the Director? Should both pure and applied optics be included? Should the Institute be entirely undergraduate, entirely graduate, or partly what was then called a trade school? Or should it be for both undergraduate and graduate work? Most seemed inclined to favor both graduate and undergraduate work; and the training of technicians was very soon eliminated, no doubt in view of the existence of the Mechanic's Institute, now vastly developed into the Rochester Institute of Technology. What size organization should be planned? Should it be autonomous or should it be associated with physics or engineering? All these and other unavoidable questions exercised the minds of everyone, and especially of those expecting to be deeply involved in the final plan.

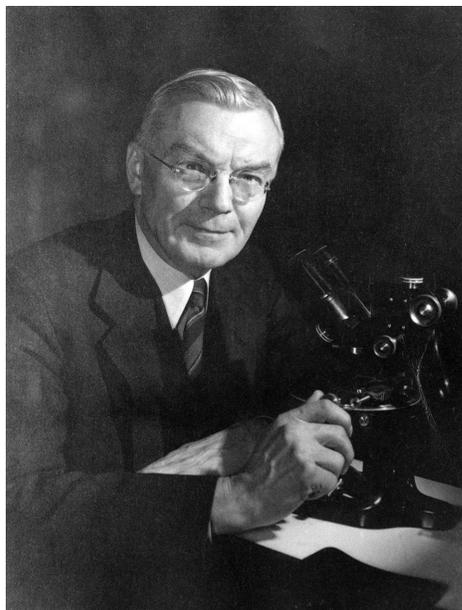
Dr. C. E. K. Mees, Director of the Research Laboratory at Eastman Kodak Company, although a chemist himself, was a charter member of the Optical Society of America and a member of its Executive Council. At that same meeting of the Council held in Baltimore on December 18, 1918, already referred to in this text, Perley Nutting, Secretary to the Board, reported that it was the hope of the Council that "the school of optical engineering to be organized in connection with the University of Rochester" would take care of the journal and other activities of the Optical Society, that such an institute would "automatically control not only education but publication of the Journal, a Handbook of Optics, and various reference handbooks in applied optics." Quite clearly, Mees took these projections for The Institute of Applied Optics to heart and proceeded to formulate in his mind the accommodation necessary for such a comprehensive program of activity. In May 1919, Mees presented a grandiose proposal for a four-storey building, 70 by 100 feet in area, complete with library and workshops. He estimated the cost of the operation for the first five years to be \$400,000, equivalent to several million dollars today. This ambitious plan apparently gave everyone concerned a good deal to think about, as little more was done until 1925.

The 1925–26 Report of the President included the announcement of the appointment of T. Russell Wilkins as Junior Professor of Physics. A Canadian, aged 35, and a graduate of McMaster University in Canada, he took his doctorate at Chicago under R. A. Millikan, in what at that time was definitely "modern physics." His thesis was "Multiple Valence in the Ionization of Alpha Rays." This appointment proved to be an important step on the way to the establishment of The Institute of Optics.

In 1926 or early 1927, a subcommittee consisting of T. R. Wilkins of the University, L. A. Jones of Eastman Kodak Company, and W. B. Rayton of Bausch & Lomb, was appointed "to outline courses to be offered in the proposed Institute of Applied Optics of the University of Rochester." Their report, submitted on June 3, 1927, listed two main lines of study: (a) the training of students in the theory of optics and optical instruments so that there may be an adequate supply of men versed in the theory and skilled in the design



Lloyd Jones, Eastman Kodak Company.



Wilbur Rayton, Bausch & Lomb.

of optical instruments: “This will make available to the industries of the country the best and latest knowledge in the field”; and (b) the training of optometrists (see Chapter III). The report also stated: “It is further hoped that among those who complete the work offered in the School of Optics some will be desirous of continuing their work. Then it is quite possible that in the future a postgraduate school can be developed in which advanced training may be given and research work in the field of optics may be encouraged.” Also, “The Committee has kept in mind in a broad way the general organization of courses in the University of Rochester so that courses already given may be utilized in so far as possible but where these existing courses are not in harmony with the general scheme new courses have been indicated.” The courses included physical and geometrical optics, physiological optics, physics for optics students, scientific German, French or history, mathematics, some chemistry, psychology, machine drawing and shop work, materials used in optical instruments, radiation and electrical measurements, and the design of optical systems. The optometry students did less optical theory and added elementary anatomy and physiology, pathology of the eye and, of course, optometric instruction and clinical practice. For all students, there were the regular freshman general education courses and some electives usefully related to the required courses.

The committee estimated that—in addition to the staff for purely optometric courses and in addition to any necessary increase in faculty in physics and other departments teaching courses to optics students—the minimum personnel for teaching specialized courses for students in optics would be three: one for advanced geometrical and physical optics courses, one for physiological optics, and one to supervise and teach shop work. It was recommended that in the beginning The Institute of Optics be under the supervision and direction of one who was essentially a physicist; that the man obtained for the teaching of geometrical and physical optics should be chosen also in consideration of his executive ability and that he would later become dean of the school.



Bausch & Lomb Building, the new shared home of the Department of Physics and Institute of Applied Optics, 1930.

On August 1, 1928, an agreement was signed between the University of Rochester, Eastman Kodak Company, and the Bausch & Lomb Optical Company, whereby the University agreed “as soon as reasonably possible hereafter” to establish and maintain an institute of optics “for the training of students in the various fields of optical science” and to prepare candidates for work in the optometric and ophthalmic fields . . .” A statement followed to the effect that a committee of three scientific representatives of the three parties to this agreement had drawn up a four-year course of study for both optics and optometry students, and that this course was approved by each of the parties.

The University agreed to set apart, without cost, the whole fourth floor of the Bausch & Lomb building being erected for the Department of Physics, with facilities and service staff to be available for use by The Institute of Applied Optics. The University also agreed to keep separate records and accounts for The Institute of Applied Optics, including estimated costs of the time given by the physics faculty and staff. The University further agreed that, to a reasonable extent, employees of the companies should be allowed to attend lectures and share other benefits of the existence of an institute of optics.

The agreement named two committees, representing the three parties to the agreement, to oversee the affairs of the Institute: a conference committee of three, which was really the professional scientific advisory committee, and a finance committee. The University further agreed to confer a B.S. in optics or its equivalent on students satisfactorily completing the course and to confer M.S. and Ph.D. degrees upon students fulfilling the requirements.

Finally, the two companies agreed to contribute up to \$10,000 each to equip the Institute with apparatus, and up to \$20,000 each per year for five years to cover the operating costs beyond what the University itself would contribute. The whole agreement was to become effective on July 1, 1928, and to remain in force until June 30, 1933. The parties also agreed to endeavor to continue The Institute of Applied Optics beyond that date under terms to be agreed upon.

The agreement was signed by Rush Rhees, President of the university, W. G. Stuber, President of Eastman Kodak Company, and Edward Bausch, President of the Bausch & Lomb Optical Company.

It was almost another year before any faculty were appointed and over a year before classes in applied optics began. On February 19, 1929, Dr. Rhees wrote to Dr. Wilkins, asking him to formulate “in conference with Dean Hoeing and also with Jones and Rayton a form of announcement for our new courses in optics.” He suggested that a special circular and a statement be prepared for announcement in the college papers and the city

press. An announcement appeared in the *Democrat and Chronicle* on March 15, 1929, in bold headlines over a well-written article.

President Rhees, in his Annual Report for 1928–29, stated that “five noteworthy developments have marked the record of the current year. One has been the execution of an agreement between the Bausch & Lomb Optical Company, the Eastman Kodak Company, and the University of Rochester for the conduct and maintenance of an Institute of Optics in association with the College of Arts and Science and particularly with the department of physics of that College.” He proceeded for two pages of that report to describe the teaching to be given. He stated that by the end of the 1928–29 academic year he had not been able to find a director—but “we are fortunate in having secured the consent of Professor T. Russell Wilkins to serve as acting Director. Associated with him on the Conference Committee will be L. A. Jones and W. B. Rayton.” Rhees reported that the Departments of Physics, Physiology, and Psychology and specialists of the cooperating industries would conduct special classes for students in physiological optics until a man could be found, “so far a vain search.”

“Our problem has been complicated,” Rhees continued, “by the fact that in recent years in this country, as well as in England and in Germany, most men who devote themselves to physics prefer to work in the fascinating new fields of atomic structure and allied problems.” Rhees, in fact, had run into the basic problem which had led to the need for special university departments of optics. Rush Rhees retired in 1935 and was succeeded by an unusually young man, Alan Valentine, from Yale.