including three vice-presidents and the secretary of the board of trustees.

It is a sad commentary upon the rate at which we live that it is impossible to do more than merely mention the names of men who devoted a lifetime to the problems in which we are so much interested—such men, for example, as the versatile and lovable Dr. Whelpley, and the charming and scholarly Dr. Power, who achieved preeminence in two countries by his important contribution to the knowledge of plant chemistry.

I can only ask the secretary of the convention to announce the names of the officials of the present convention who have passed away, and, in accordance with custom, ask you to stand for a few moments in honor of the dead.

OBITUARY

RALPH HAMILTON CURTISS

THE death of Dr. Ralph H. Curtiss, professor of astronomy and director of the Astronomical Observatories of the University of Michigan, which occurred on Christmas Day, 1929, brought grief to a wide circle of friends to whom he was endeared by the kindly and lovable traits of his character. To the world of science and to the university which he had served so faithfully and ably his loss is a grievous one. Both by his own researches and through the inspiration and wise counsel generously given to his students and coworkers, he has contributed notably to the advancement of astronomy. It is one of the tragedies of his untimely death that he was about to see the realization of the project for a new and larger observatory in a more suitable location for which he had planned and worked unceasingly. During his last illness the land for the observatory site was purchased, and it is to be hoped that the new edifice will be constructed in accordance with his plans as a fitting tribute to his memory.

Ralph Hamilton Curtiss was born at Derby, Connecticut, February 8, 1880, of Puritan parents, Hamilton Burton and Emily Wheeler Curtiss. The early training in this Puritan home, ordered in accordance with the fine traditions of the stock, left a lasting imprint upon his character and was reflected in many of the outstanding qualities which characterized his life —a high sense of duty and justice, untiring devotion to his work and a deep appreciation and love of scholarly attainments. In 1892 the family moved to Redlands, California, where young Curtiss received his elementary education, graduating from the local high school at the age of sixteen, with high honors.

After a year spent in working and saving to provide funds for his college education, he enrolled in the fall of 1897 as an undergraduate at the University of California, where for the next four years he not only maintained a high scholastic record, but entered enthusiastically into the many activities of student life. He was a good "mixer," popular in his fraternity, Delta Tau Delta, and in fact with all his associates, both students and faculty. To his genial and lovable traits was added the rare talent of a musician. He was a member of the University Glee Club and played the violin with unusual skill. Early in his academic career Curtiss was attracted especially to the science of physics largely through the influence and inspiration of the late Professor E. P. Lewis. Later he was drawn to astronomy by another great and inspiring teacher, Professor A. O. Leuschner, and he seems to have decided as early as his junior year to become an astronomer. Recognition of the excellence of his work as a student came through election to Phi Beta Kappa in his junior year, and of his standing in astronomy by his appointment the following year as an assistant in the Students' Observatory.

Early in 1901, with the requirements for graduation practically completed at the middle of his senior year, Curtiss was sent as a member of the Lick Observatory expedition to Padang, Sumatra, to observe the total solar eclipse of May 17–18. The degree of bachelor of science was conferred upon him by the University of California in 1901 during his absence on eclipse duties. There followed three years of graduate study in astronomy at Berkeley and Mount Hamilton, during which time he held one of the Lick Observatory fellowships. His work in this period laid the broad foundation for the future brilliant and successful career in his chosen field. He was equally conversant with the theoretical and the observational side, whether the subject lay in the older field of astronomy or in that of astrophysics. Keen and active of mind, skilful in the manipulation of instruments, untiring in his devotion to work, he was recognized by the members of both departments as a man of outstanding ability and scholarly attainments. At the Lick Observatory he made an extended spectrographic study of the Cepheid variable W. Sagittarii. In the course of this work he showed that low dispersion could be applied successfully to the determination of the radial velocities of stars of the later spectral classes through the use of a method which he developed for the measurement and reduction of the spectrograms. This method, to which he gave the name of "zero standard," satisfactorily eliminates the errors arising from uncertainties in the adopted wavelengths of the lines produced by the effect of blends,

and has since found wide application in radial velocity work. The results of this investigation were presented as his doctor's dissertation under the title "I. Proposed Method for the Measurement and Reduction of Spectrograms for the Determination of the Radial Velocities of Celestial Objects. II. Application to a Study of the Variable Star W. Sagittarii." The degree of doctor of philosophy was conferred upon him in 1905 by his alma mater.

In May, 1905, Dr. Curtiss was appointed assistant astronomer in the Allegheny Observatory, where the following two years were devoted, in collaboration with Director Schlesinger, to the initiation and development of the spectrographic program. When plans were formulated for astrophysical research at the Observatory of the University of Michigan, Dr. Curtiss was called to this institution in 1907 as assistant professor of astrophysics and placed in charge of the development of this phase of the observatory's activities. Under his supervision a spectrograph of one-prism dispersion was constructed from his design for use with the new 37½-inch reflector, and a program of spectrographic observations for certain interesting classes of stars was undertaken with marked success. Four years later he was promoted to associate professor and assistant director of the observatory and in 1918 became professor of astronomy. In March, 1927, he was appointed director of the Observatory of the University of Michigan in succession to William J. Hussey, whose death occurred while he was *en route* to Bloemfontein, South Africa, the station of the Lamont expedition for the observation of southern double stars. The work at this station was organized under the direction of Professor Curtiss in accordance with Professor Hussey's plans and is being ably carried on by Dr. Rossiter.

Since 1911, Professor Curtiss had not only directed the spectrographic program of research at the observatory, but had given graduate courses in spectroscopy and astrophysics, in addition to the more elementary work in descriptive astronomy in the university. During the war he offered courses in navigation, which were attended by hundreds, some of whom later saw service with the naval forces of the country. His lectures were clear and concise, and were presented in a careful and pleasing manner. He was an inspiring teacher and he had the faculty of imparting to his students some of his own high ideals of scholarship and enthusiasm for research. His students learned to respect and love him for his manly qualities, for the fairness with which he treated every question concerning them and for the sincere interest he took in their welfare. Most of those taking the doctorate in astronomy at the University of Michigan in recent years worked under his direction and the high quality of their researches is eloquent testimony to his ability as a scientific teacher and director of research.

Professor Curtiss's researches and those of his students were confined principally to the field of stellar spectroscopy, but in this they cover a wide variety of subjects. As the result of his earlier experience at the Lick Observatory he quite naturally turned his attention to the rich field offered by the use of low dispersion instruments and in particular to the application of such instruments to the study of stars having early type spectra, which on account of the character and small number of the lines are especially suited for observation in this manner. That this field proved a most fruitful one under his cultivation is shown by the number of important papers which came from his hand. His most extended investigation and one of his most important contributions relates to a study of Class B stellar spectra containing emission lines. The program of observations begun at Allegheny and continued at Michigan consisted, in addition to a few spectrograms on each of a number of these stars, of a long series of plates on several typical objects for a detailed study of the intensities and widths of the emission lines, and in particular for following the changes in intensity and position of the lines that occur in spectra of this class. These researches are described in detail in six memoirs appearing in the *Publications of the Detroit Observatory,* while the results of his more recent investigations on this subject were in course of preparation for publication when he was stricken with fatal illness.

From the beginning Dr. Curtiss realized that the solution of the problem of the physical nature of the Class B stars whose spectra exhibit bright lines was to be obtained only through a thorough and systematic study of these spectra and that to secure the necessary observations would require many years. It was along these lines that his investigations were planned. To unravel the intricate details on the fine series of spectrograms required no little patience and skill. Finally, the results were collected and their bearing upon the probable physical conditions existing in the stellar atmosphere critically discussed. Among the many important results of these researches we may note the interesting relation found to exist between the widths of the emission lines and their wave-lengths, a relation which he has interpreted on the basis of certain plausible assumptions concerning the distribution of vapor density at different atmospheric levels in which the various emission lines have their origin. Many of the perplexing problems concerning the peculiar behavior of the bright-line B stars still await the final answer, but as the result of Curtiss's researches a very important advance has been made toward the solution of some of these.

Studies of the two eclipsing variables, Algol and β Lyrae, made by Professor Curtiss have yielded most important information concerning these very interesting systems. In the former system he was able to show conclusively the presence of a third component having a period of 1.9 years. Minor irregularities in the observed velocity curve of Algol suggested another problem, solved several years later by one of his students at Michigan, Dr. D. B. McLaughlin, who found that these are produced by the rotation of the bright component. His pictorial study of the spectrum of Nova Geminorum II, representing the spectral changes in the star observed at the Michigan Observatory, furnished data of great value, which in combination with the observations of others enabled some of the more important variations occurring in the spectrum of this nova to be traced.

For the past few years Professor Curtiss had been engaged, with several of his colleagues and students, in an extended investigation of the difference in displacement shown by spectral lines originating at different levels in the atmospheres of Cepheid variables. This effect, discovered at the Michigan Observatory, is one of great importance in connection with the problem of Cepheid variation, and its final elucidation should throw considerable light upon the complex motion taking place in the atmosphere of a pulsating star.

Dr. Curtiss's published researches are contained in some eighteen memoirs, appearing in the *Publications of the Astronomical Observatory of the University of Michigan, Bulletin of the Lick Observatory, Publications of the Allegheny Observatory* and in astronomical journals. In addition he contributed a number of shorter papers to current astronomical literature. He had just completed the chapter on "Classification and Description of Stellar Spectra," which he was preparing for the fourth volume of the "Handbuch der Astrophysik." Several extended investigations were also in a well-advanced stage and it is hoped that these will be completed by his colleagues at an early date.

Recognition of his scientific work came to Professor Curtiss from many learned societies. He was a fellow of the Royal Astronomical Society, member of the American Astronomical Society, of the Seismological Society of America, Phi Beta Kappa, Sigma Xi, a fellow of the American Association for the Advancement of Science and a member of Commission No. 29 "On Stellar Spectra" of the International Astronomical Union.

Professor Curtiss is survived by his widow, Mary Louise Welton Curtiss, to whom he was married in 1920, and by a brother, Dr. David Raymond Curtiss, professor of mathematics in Northwestern University. Dr. Curtiss was fond of his home life and was never so happy as when playing the host to one of his colleagues. He took an active interest in civic affairs and in the social life of his community. In the world of science he was recognized as a leading authority on stellar spectra, our knowledge of which he has enriched through a long line of most fruitful researches. As an investigator he exhibited marked skill and originality in the treatment of difficult problems, patience and extreme care in the consideration of every detail of the work to the end that the data should have the maximum precision, and finally true scientific caution in the interpretation of his observational results. He was a scientist of wide vision and high ideals and possessed to an unusual degree the power of stimulating others.

J. H. MOORE

LICK OBSERVATORY

SCIENTIFIC EVENTS

THE UNITED STATES BUREAU OF FISHERIES

WORK on the nation-wide five-year construction and maintenance program has been begun by the Bureau of Fisheries in accordance with the act of Congress approved on May 31, according to an oral statement made by the Deputy Commissioner, Lewis Radcliffe, on July 8 to the *U. S. Daily*. One important feature of the act is that provision is made for cooperation between the bureau and states, counties, municipalities, individuals and public and private agencies.

The bureau may also accept donations of lands, funds and other aid to the development of the program under the provisions of this act. It authorized additional appropriations for new stations, laboratories and distribution cars to the amount of $1,885,000; annual increases in appropriation for the division of fish culture of $100,000, and increase in appropriation for the divisions of inquiry and fishery industries at the rate of $60,000 and $35,000 per annum for the five-year period, he outlined.

Of the increase for the fish culture division not more than 30 per cent. is for salaries and for the other divisions 40 per cent. The total increases for the fifth year authorized for the three divisions will be $50,000, $300,000 and $175,000, respectively.

Authorizations for new construction by years follow:

Fiscal year beginning July 1, 1930: Fish-cultural stations—New Mexico, $50,000; Louisiana, $50,000, and