

EDWARD BALL KNOBEL was born in Baker Street, London, on 1841 October 21. He was the second son of William Edward Knobel, a solicitor in Lincoln's Inn Fields. His mother's family were closely connected with the Exchequer. She was the eldest daughter of William Henry Roberts, Deputy-Clerk of the Pells, who was the son of Edward Roberts, Clerk of the Pells in succession to Addington and Barré.

Mr. Knobel received his early education at La Capelle in France, and subsequently at the Stockwell Grammar School. On leaving school he read law for a couple of years, but having a strong enthusiasm for geology he, in 1861, entered the Government School of Mines in Jermyn Street with the intention of working for the Geological Survey. The course of study was for three years, but he decided to take the subjects of the first two years at once; but though in 1862 he passed all his examinations with credit (for which he was complimented by Sir Roderick Murchison) he gave up this branch of study, and was recommended by Professor A. W. Hofmann to Messrs. Bass & Co. at Burton-on-Trent to fill a vacancy in their brewery staff as analytical chemist. Here he remained for thirteen years, and became a Manager and Head Brewer. Subsequently he was appointed Manager at Messrs. Courtauld & Co.'s silk factory at Bocking, where he remained for many years; but the continued ill-health of his wife in the country compelled him to relinquish this position and remove to London, where he was appointed Managing Director of the Ilford Photographic Company.

His interest in Astronomy dates from childhood, when at eight years of age his imagination was roused by some elementary scientific books; and being taken soon after on a geological excursion, the investigation of the fossils he then found influenced the whole of his subsequent life and led to his devoting himself to a scientific career. In the early 'sixties he acquired a 3-inch telescope, and in 1872 he purchased an 8½-inch reflector by Browning. With these instruments he made many observations and drawings of Sun, Moon, Planets, Comets, and Nebulæ. He devoted himself particularly to photometry, and invented an astrometer with which he made many observations of the brightness of stars by the method of limiting apertures, and published the results in the *Monthly Notices*. He also made a large number of measures of double stars with a double-image micrometer. In 1875 he prepared a Reference Catalogue to certain astronomical researches (*M.N.*, vol. xxxvi.) which involved the laborious work of going through every volume of the *Transactions* of Academies in the library of the Royal Society. It is unfortunate that time did not permit of making this catalogue in more detail. In the course of this work he prepared a Memoir on the Chronology of Star Catalogues (*Mem. R.A.S.*, vol. xliii.). This investigation led him to the study of Oriental astronomy and to acquire some knowledge of Arabic and Persian. In 1879 he published a translation from a Persian MS. of Ulugh Beg's catalogue of stars. At this time he determined to collate Greek, Latin, and Arabic manuscripts of Ptolemy's *Almagest* with the object of obtaining a more correct edition of Ptolemy's catalogue of stars than the printed editions furnished. Some years

later he learned that Prof. C. H. F. Peters was occupying himself with the same subject, and accordingly proposed to join forces and to place all the materials he had collected at Professor Peters's disposal. On the latter's death in 1890 all his notes and manuscripts were sent to Knobel to prepare for publication. No means of publication seemed possible in this country, but an appeal to the Carnegie Institution of Washington resulted in the whole work being published by them in 1915. Knobel then took up the collation of some thirty Persian manuscripts of the star catalogue of Ulugh Beg, which was published by the Carnegie Institution in 1917.

Knobel's last instrumental work was a short series of observations of Mars at the Opposition of 1884, when the north pole of the planet was turned to the Earth (*Mem. R.A.S.*, vol. xlviii.). This contribution is typical of Knobel's gift of seeing something that should be done and doing it. Though excellent drawings of this planet had been made by others, these were mainly of its southern hemisphere, because at times when the north pole is in view Mars is near aphelion, and the small apparent diameter of the planet had led to its neglect. This, however, did not deter Knobel, and though he was not favoured with specially fine weather he produced with Mr. Wesley's help a series of drawings that form a valuable item in the records of the planet's surface. Though from this time forward his actual personal astronomical work was of a literary nature, as above described, his experience as an observer, and the knowledge he had necessarily gained in reduction of observations for the editions of ancient catalogues, made him a vigilant critic of many branches of astronomy, and there were few subjects brought before the meetings on which he was not able to offer an opinion. In 1910 he accepted the invitation to become President of the British Astronomical Association, though it may be said in passing that the foundation of that body in the year 1891 had not met with his complete approval, for he feared lest it might have an adverse effect on our Society, whose welfare he had so much at heart. Later, however, the organisation had his warm encouragement, and an address on "Numerals in Ancient Manuscripts" which he delivered before the Association at a meeting in 1908 May, and which embodied much knowledge that he had gained in his study of the *Almagest*, may be read in the *Journal* of the Association of that date. In the first of his Presidential addresses he spoke of the prominent features of the astronomy of the day, and for his second he took the subject of "Stellar Photometry," on which he was so competent to speak, giving concise but complete descriptions of various methods (*B.A.A. Journal*, vol. xxiii.). The speeches of thanks on this occasion were of more than *pro forma* sincerity. They recounted how the Association during his term of office had become an incorporated company, necessitating a great deal of work of which Mr. Knobel had taken the lion's share, and in which his business knowledge and the care with which he entered into every detail were invaluable. A remark made on the occasion by one who knew him well may be mentioned—that it was a pleasure to consult Mr. Knobel on any

subject, because he could always enforce his advice by reference to old precedents and memories of astronomers who might not have been known to many of his contemporaries. The qualities thus implied were among those that made him valuable to the Society. He was always ready to help tactfully, but firmly and efficiently. To go back to an early period in his career for an instance, reference may be made to what was known as the Sadler-Smyth scandal, which occurred in 1879; Mr. Knobel volunteered to enquire into this, and brought it to a satisfactory conclusion by a paper of twenty-five pages in the *Monthly Notices* for 1880 June.

It is a little difficult to give to those who did not know him an adequate idea of the many-sidedness of Dr. Knobel's interests. He was a Fellow of the Geological Society for twenty-five years. He received the Honorary Freedom of the Spectacle Makers Company in 1899. Literature and art appealed to him almost as much as science. He was an enthusiastic musician and played the violin. For twenty-three years he played in the orchestra at the Festival performances at the Crystal Palace. He played violin solos at numerous concerts and was on the Council of the Queen's Hall Sunday Concert Society. He was often to be seen at Lord's Cricket Ground. His services to Astronomy, particularly his editions of part of Ptolemy's *Almagest* dealing with Astronomy, and of the catalogue of Ulugh Beg, were recognised in 1927 by the award of an Honorary D.Sc. by the University of Oxford. On the occasion of the conferring of the degree, the Public Orator said: That from his earliest years Dr. Knobel had devoted himself to astronomy, and was distinguished as a writer *inter illos qui artis omnium candidissimæ historiam persequuntur*. He was *siderum codicumque scrutator*, an expert in Oriental languages as well as in astronomy, both ancient and modern, under whose guidance we could follow the courses of the stars *si non ab Aenea et Palinuro, at certe ab felicissima illa Antoninorum aetate*. He had edited that part of Ptolemy's *Almagest* which contains the catalogue of the stars, with such care *ut auctoris eruditi non verba tantum, teneret, sed etiam numeros*. By his skill as a palæographer he had in many places restored the numbers corrupted in transmission, and had reduced to order Ptolemy's lists of the stars. He had also edited the catalogue of the stars made five hundred years ago on the basis of Ptolemy's work by Ulugh Beg, *invicti ducis Tamerlani nepos*. If that King, who was described as *doctus et in mathematicis perfectus*, were alive to-day, he would be thought worthy of all honours, and Oxford therefore welcomed his interpreter, *senem indefessum, astronomiæ antistitem*.

Dr. Knobel was elected a Fellow of the Society on 1873 March 14, and served on the Council continuously from 1876 to 1922, when he retired on the death of his wife, but allowed himself to be re-elected in 1923. He served the office of Secretary for ten years, was President in 1892 and 1900, and was Treasurer for many years. He was constantly on the House Committee, the Photographic Committee, and the Library Committee. His wide knowledge and the ease with which he read foreign languages made him a useful guide in the choice of books. He

was always ready to take trouble about cataloguing and binding and the rearrangements which from time to time are required in a library. On the Council he was very conservative in anything concerning the conduct of the Society, *e.g.* he opposed the alteration of the hour of meeting, but when this change was once made accepted it with the utmost loyalty. On the other hand, he took an active part in the movement to admit women to the Fellowship of the Society, though he had been an early opponent of this measure. His colleagues on the Council and many friends in the Society will always remember him with affection.

Dr. Knobel married Margaret, daughter of Henry Whitehead, in 1869. Her death occurred in 1922, after fifty-two years of the happiest wedded life. He leaves a family of two sons and two daughters. He was blessed with good health till the last few months of his life. He died on 1930 July 25, full of years of happy and useful activity.

F. W. D.

The REV. FRANCIS ANTHONY TONDORF, S.J., was born at Boston, Mass., the son of Joseph and Louise Musler Tondorf. Deciding in early manhood to join the Society of Jesus, he studied at Woodstock College, from which he received the degree of A.B. in 1895. For the next two years he acted as Professor of Physics at Loyola, and from 1897 to 1899 he continued his studies at Johns Hopkins University. He was a man of wide scientific pursuits and accomplishments, as his further academical activities show. In 1905 he became Assistant Observer at Georgetown Observatory, collaborating with the late Father Hagen, who subsequently became the Director of the Vatican Observatory. In 1913 Father Tondorf was elected Professor of Physics at Georgetown. At the time of his death he was Professor of Geology at the College, and also taught in the Medical School as head of the department of Physiology. Father Tondorf's best work, however, was done in Seismology. He is largely responsible for the development of the seismological station at Georgetown, which is one of the best equipped in the world.

He received the degree of Ph.D. from Georgetown in 1914. He belonged to many scientific societies, including the Meteorological Society, the American Seismological Society, the Geophysics Union, the Washington Academy.

In view of his various duties and interests, he had little time for rest. In addition to his teaching duties, he would continue his own seismological work until midnight and be content with only four hours of repose. He died on 1929 November 29, and is survived by one sister, Mrs. Mary Galvin of Chestnut Hill, near Boston, Mass.

He was elected a Fellow on 1927 February 11.

PROFESSOR H. H. TURNER, who died at Stockholm 1930 August 20, four days after an attack of cerebral hæmorrhage while occupying the chair at a meeting of the Seismological Section of the International Union of Geodesy and Geophysics, was elected a Fellow of the Society