After his retirement from the Royal Observatory Hollis continued to be as keenly interested as ever in all that went on in the astronomical world, and seldom failed to attend the meetings of the Society. He will be remembered by all who knew him as a quiet and courteous gentleman who had a deep knowledge of his subject and who was always willing to assist those who were interested in astronomy.

In 1882 he married Clara Susanna Clark, who predeceased him in 1932. He died on 1939 August 7 and is survived by one daughter and two sons. He was elected a Fellow of the Society on 1884 December 12, and served on the Council from 1909 to 1912.

P. J. MELOTTE

JAMES THOMAS JACKSON was born at Frankfort, in King's County, Ireland, and entered Trinity College, Dublin, in 1890, where he earned distinction in mathematics and also in experimental science. He obtained a Foundation Scholarship in Mathematics and an Honours Degree in the same subject, and first place at the Honours Degree examination in Experimental Science (Physics and Chemistry). His interest in astronomy seems to have been stimulated by Sir Robert Ball's lectures on that subject.

After taking his degree he passed through the Engineering School and practised as an engineer in Siam for three years, and afterwards in Ireland. In 1903 he was appointed Assistant to the Professor of Physics in Trinity College, Dublin, becoming later a Lecturer on the staff of the Engineering School, which appointment he held till his death. He was a member of the Institute of Civil Engineers, Ireland, and occupied successively the positions of Honorary Secretary and President.

He was a man of infinite kindliness and charm of manner, beloved by many generations of engineering students. To him past students came at difficult crises in their careers, rightly believing that his advice was more than ordinarily useful in directing them into the most promising avenues of professional service.

He married Elizabeth, daughter of Louis Damer Mulhall, and is survived by his widow and two sons, both civil engineers. His death took place on 1938 November 22.

He was elected a Fellow of the Society on 1909 January 8.

J. R. COTTER

ARTHUR EDWIN KENNELLY, a Fellow of the Society since 1893 June 9, was an electrical communications engineer of world repute. He was born at Colaba, near Bombay, India, on 1861 December 17, and died on 1939 June 18. In 1893 he married Julia Grice of Philadelphia, who predeceased him in 1939; they are survived by one son.

Kennelly was educated at schools in Great Britain, France and Belgium, mainly at University College School, London. At the early age of thirteen he heard a lecture by Latimer Clark on Submarine Telegraphy at the Albert

Hall, London, which attracted him to the career of a telegraphic engineer. He began work at fourteen as assistant secretary to the Society of Telegraphic Engineers, London (which afterwards became the Institution of Electrical Engineers), and a year later he started practical engineering work in the submarine cable service of the Eastern Telegraph Company; he continued for eleven years to be occupied with the cables connecting England and India.

In 1887 he migrated to America, which became his home for the rest of his life; he went to assist Edison, with whom he remained until 1894. Then followed a period in which he carried on practice as a consulting engineer. In 1901 he was appointed to the Professorship of Electrical Engineering at Harvard University: during the years 1913–23 he also held a professorship at Massachusetts Institute of Technology. He retired as Professor Emeritus in 1930.

His scientific work was mainly connected with his profession as a practical, consulting and teaching electrical engineer. He published no less than 28 books (18 in collaboration) and over 350 technical papers. Many of these were concerned with the application of complex quantities, and especially of complex hyperbolic functions, to alternating current problems.

One achievement which bids fair to keep his memory long in mind also associates his name with that of Oliver Heaviside, who likewise cultivated the field of electrical theory. The two men were in many ways remarkably different, but they had this in common: both attained to high scientific eminence through their contributions to a difficult and rapidly developing subject of great practical importance; and both were largely self-taught, not having had any regular university education. Heaviside was doubtless the greater scientist, but his genius was combined with a difficult attitude towards the world; Kennelly had *savoir faire* and agreeable manners, and in consequence his distinguished talents were rewarded by a prosperity never attained by Heaviside.

Their names are linked together in the designation "Kennelly-Heaviside layer," often applied to the lower of the main ionized strata in the ionosphere; an alternative impersonal name is the E layer. In the early days of radio telegraphy it was found that radio waves travelled much farther round the world than the electrical theories then current would suggest. In 1902 first Kennelly, and later Heaviside (independently), suggested that this might be due to the existence of an ionized conducting layer in the upper atmosphere. This has since been confirmed; at the time neither author seems to have been aware that the presence of such a conducting layer had been postulated about twenty years earlier by Balfour Stewart, on the evidence of the transient variations of the Earth's magnetic field.

Kennelly received an abundance of American and foreign honours and awards for his scientific and professional achievements. In his later life he also took a considerable part in international scientific gatherings connected with telegraphic and radio science and with electrical units: his personal charm and his linguistic gifts made him a valuable member of such gatherings.

S. CHAPMAN