

nomical work, and frequently attended the meetings of the Society. He also attended many of the meetings of the British Association, including those held in South Africa and Canada.

He died in the Isle of Man on 1913 September 23, leaving a widow, two sons, and a daughter.

He was elected a Fellow of the Society 1869 January 8.

JAMES LUDOVIC LINDSAY, 26th Earl of Crawford, and 9th Earl of Balcarres, Lord Lindsay of Balcarres, and Baron Balniel, in the peerage of Scotland, and Baron Wigan in the peerage of the United Kingdom, was born on 1847 July 28, at St. Germain-en-Laye, France. He was educated at Eton, and at Trinity College, Cambridge, where he devoted himself especially to astronomy. In 1870 he observed the eclipse of the Sun at Cadiz, and two years later, with the cordial co-operation of his father, he commenced the erection of the afterwards famous observatory at Dun Echt, in Aberdeenshire. Here he installed an 8 $\frac{1}{4}$ -inch meridian circle by Simms, a 15-inch equatorial telescope by Grubb, and a liberal supply of spectroscopes and other accessories. In planning and equipping the observatory he was fortunate in securing the co-operation of the late Sir (then Mr.) David Gill, then resident at Aberdeen, whose growing reputation as an observer had attracted the attention of Lord Lindsay and his father. Gill was put in charge, and was connected with the observatory in the very active years of its foundation and during the Transit of Venus expedition of 1874.

From 1876 to 1889, the astronomer in charge at Dun Echt was Dr. Ralph Copeland, with Mr. J. G. Lohse, and subsequently with Mr. (now Professor) L. Becker, as assistant. The observatory became well known as a centre of astrophysical research, and many valuable observations of the spectra of comets, stars, and nebulae were secured. The "Dun Echt Circulars" were for some years an important source of early information relating to astronomical phenomena; the last, No. 179, was dated 1890 January 29.

A characteristic feature of Dun Echt Observatory was the magnificent library, one of the finest collections of astronomical books in the world, and especially rich in ancient and rare works.

Before his succession to the earldom, Lord Crawford took an active personal share in the work of the observatory, and also organised, at great expense, an expedition to Mauritius for observations of the Transit of Venus in 1874, on which he was accompanied by Gill and Copeland. The observations of the Transit itself were marred by the weather, but the expedition secured extensive determinations of longitudes, and a preliminary attempt was made to determine the solar parallax from observations of the minor planet Juno. Not much importance was attached to the results for the parallax, but the value of the method was established, and Gill subsequently put it to excellent use.

The results of the Mauritius observations are contained in the second and third volumes of the "Dun Echt Observatory Publications," the first volume of which was a summary of Struve's

*Mensuræ Micrometricæ*, conveniently rearranged to meet the needs of double-star observers. Many papers emanating from Dun Echt were communicated to the *Monthly Notices*.

Lord Crawford succeeded his father in 1880, and soon afterwards ceased to reside at Dun Echt, which he had determined to sell. On coming into possession of his uncle's property at Balcarres he determined to rebuild the observatory there, and a site was actually settled upon, when circumstances arose which diverted his plans. In 1888 Piazzi Smyth resigned his professorship and post as Astronomer Royal for Scotland, which carried with it the charge of the small ill-equipped observatory on the Calton Hill. The future was hanging in the balance and probably the small support then given by the Government would have been withdrawn altogether had not Lord Crawford come to the rescue by offering the whole of his magnificent collection of instruments and books as a gift to the nation, subject to the condition that the observatory should be rebuilt upon a suitable site and maintained in a proper manner. By this noble offer the creation of the present fine Royal Observatory on Blackford Hill was made possible; and by it, as much as by his previous work at Dun Echt, Lord Crawford contributed in no small degree to the progress of astronomical science. An interesting account of the circumstances was given by Lord Crawford at the opening of the new Royal Observatory in April 1896.

The most important part of this gift was the library, containing some eleven thousand printed books besides a collection of very valuable Latin MSS. The nucleus of this library had been formed by the library of the late Charles Babbage, and many rare books were added from the library at Haigh Hall. The collection is especially rich in Comet literature. Lord Crawford never lost an opportunity of securing essays and tracts on Comets. Fifty-four pages of the very fine catalogue of the library are occupied by this subject alone.

Lord Crawford was also well known as an enthusiastic yachtsman. In 1901 he purchased the steam yacht *Valhalla*, with which he won third prize in an ocean race from New York to the Lizard in 1905. In the following winter he made a long and memorable voyage, during which he visited South America, South Africa, Ceylon, and Madagascar, and took the mails to remote Tristan da Cunha. This was essentially a scientific undertaking, and the most important British enterprise of the kind since the great expedition of the *Challenger*. Several naturalists accompanied Lord Crawford, and many valuable specimens were subsequently presented to the British Museum, of which he was a trustee.

Lord Crawford was also a noted bibliophile and philatelist. His library at Haigh Hall, Wigan, was one of the finest private collections of literary treasures in the world; a large portion of it was some years ago dispersed by auction. He was chairman of the Wigan Free Library for 35 years, during which time he enriched it with many valuable gifts. His early interest in the collection of stamps was renewed in 1900, when he purchased a

collection at Messrs. Sotheby's. The most remarkable of his subsequently large collections included the stamps of Great Britain, the United States, and the old Italian States. He also formed a large philatelic library, which he left to the British Museum.

In 1878 and 1879 Lord Crawford was President of the Royal Astronomical Society in succession to Sir William Huggins. He was elected a Fellow of the Royal Society in 1878, and an Honorary Associate of the Prussian Academy of Sciences in 1883. He was much interested in photography, and was President of the Royal Photographic Society from 1896 to 1900. In 1910 he succeeded the present King as President of the Royal Philatelic Society.

From 1874 to 1880 he represented Wigan in the House of Commons, and afterwards sat in the Upper House as Lord Wigan.

In 1869 Lord Crawford married Emily Florence, second daughter of Colonel the Hon. Edward Bootle-Wilbraham, and granddaughter of Edward, first Baron Skelmersdale. He died on 1913 January 31, leaving five sons and a daughter.

He was elected a Fellow of the Society on 1871 January 13.

THOMAS CUSHING was born at Islington in 1840. He was educated privately. From an early age he showed an interest in science, and in 1863 was appointed to a junior post in the firm of Thomas Cooke & Sons of York. In 1867 he entered the service of the India Office, and was appointed assistant inspector of scientific instruments at the India Store Depôt; on the death of Colonel Strange in 1876 Mr. Cushing was appointed his successor. Up to this time the instruments required for India were mainly those connected with the great surveying work carried on in that country, but electrical apparatus now began to assume the great importance it has since attained. Mr. Cushing became more and more constantly occupied in testing and sending out electrical instruments, from telegraphic apparatus to large electrical installations. About 1902 some difficulty occurred in connection with a long telegraph line, owing to inadequate insulations, and he therefore designed a new form of insulator, specially suited to the climate of India, by which the defects were successfully overcome. He also invented and patented the Cushing reversible level, for which he received a Government reward. His work increased so much that an assistant inspector was appointed in 1903. By his unflinching kindness he endeared himself to his colleagues and all those with whom his official duties brought him in contact.

After his retirement in 1905, he spent some years in Hanover, and then took up his residence at Woodside, where he lived till his death. He was active in all local matters, but especially those connected with technical education, and was one of the founders of the Croydon Polytechnic. His duties at the India Office had brought him into contact with the late Mr. W. F. Stanley, who became his intimate friend, and consulted him with regard to the founding of the Stanley Technical Trade Schools and Halls, of which Mr. Cushing became one of the Governors.