

Townsend, John Sealy Edward

by Patricia M. Byrne

Townsend, John Sealy Edward (1868–1957), mathematical physicist, was born 7 June 1868 in Galway, second son among three sons and two daughters of Edward Townsend, professor of civil engineering at QCG, and Judith Townsend, daughter of John Sealy Townsend, Dublin barrister and master of chancery (1826). His parents were distant cousins. Known as 'Edward', he went to the Corrib School in Galway and entered TCD (1885) to study mathematics, mathematical physics, and experimental science. After being awarded a foundation scholarship (1888), he graduated with a double moderatorship and first place in mathematics (1890). For the next four years he obtained fellowship prizes, enabling him to continue his mathematical work and also undertake some lecturing. In 1897 he went to Trinity College, Cambridge, where he and Ernest Rutherford (considered the father of nuclear physics) were the first non-Cambridge graduate research students of Sir J. J. Thomson. The Irish contingent at the Cavendish Laboratory was quite strong and included Joseph Larmor (qv) and John Alexander McClelland (qv). The following year he was made Clerk Maxwell scholar (1898), then fellow of Trinity College, Cambridge (1899), and assistant university demonstrator (1899–1900). His brilliance enabled his appointment at the age of 32 to the new Wykeham chair of experimental physics at Oxford (1900), where he initiated the teaching of electricity and magnetism and managed the new electrical laboratory which was eventually built for him in 1910. He remained as professor till his retirement.

During his academic life he pioneered work on the experimental and theoretical study of electrical conduction in gases. After the discovery of the electron by J. J. Thomson in 1897, Townsend was the first to determine a value for the charge on the electron (1898). He used three simple instruments: a laboratory balance, an electrometer, and a photographic camera. This method was later modified by Robert Millikan's more precise method using charged droplets of oil (1911). Townsend also made major contributions to the kinetic theory of gases. He developed a theory of ionisation by collision from his investigations on the movement of a weak electric current through low-pressure gas, the so-called 'Townsend discharge'. He showed that collisions of electrons released more electrons, thereby fuelling an avalanche effect which carried an electric charge through a gas. Later he simultaneously discovered with German scientists what came to be known as the Ramsauer–Townsend effect, whereby the average free path of an electron is dependent on its energy.

Singular in his approach to science, he was sceptical of new ideas. His strong personality and work ethic influenced his research group, and it too was seen as somewhat isolationist. Seldom reading scientific publications, he nevertheless published extensively in numerous journals. A complete list of his publications is

found in his Royal Society obituary (1957). Of his books, *Electricity in gases* (1915) was the best-known; they also included *The theory of ionisation of gases by collision* (1910), *Electrons in gases* (1947), and *Electromagnetic waves* (1951). During the first world war he abandoned his research at Oxford, took up wireless research for the Royal Naval Air Service, and taught cadets. After retirement he returned to this subject and published *Electricity and radio transmission* (1943).

He received many honours in his lifetime: he was elected FRS (1903) and awarded the Hughes medal (1914), was made a Chevalier de la Légion d'Honneur, a member of the Institute of France, and a member of the Franklin Institute, and received an honorary D.Sc. from Paris and a knighthood (1941). His contact with his alma mater was renewed in 1920 when he was appointed a member of the royal commission sent to assess the financial needs of TCD after the first world war.

An active man, he was reluctant to retire completely in 1941, and at the age of 73 he taught at Winchester College for a short time. He was a keen huntsman and played tennis till he was 70 years of age. A good conversationalist, he enjoyed arguments but disliked publicity and the formality of university affairs. He was remembered for his directness, clarity of mind and informality. He died 16 February 1957 at Oxford at the age of 88.

He married (1922) Mary Georgina, daughter of Peter Fitzwalter Lambert and July Mary (née Hewstone) of Castle Ellen, Co. Galway. His wife was active in the civic and social affairs of Oxford, was JP, mayor, and honorary freeman of the city, and was later awarded the OBE. They had two sons and lived at 55 Banbury Road, Oxford.

DNB; Richard and Dorothea Townshend, *An officer of the Long Parliament* (1892), 225; *Biographical Memoirs of Fellows of the Royal Society*, iii (1957), 257–72; R. B. McDowell and D. A. Webb, *Trinity College Dublin 1592–1952: an academic history* (1952), 426; *Trinity*, ix (1957), 50; *WWW*; www.xrefer.com/entry/495272 (accessed 29 Oct. 2002)