

MILNE, John (1850–1913)

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John Milne was born in Edge Hill, Liverpool on 30 December 1850 and died of kidney failure on 31 July 1913 at Shide, Isle of Wight. He was the only child of John Milne, wool-stapler, of Rochdale, Lancashire, and his wife Emma (née Twycross). Milne studied Applied Sciences at King's College, London (1869-71), and was awarded its degree-equivalent Associateship. He then studied mining at the Royal School of Mines (RSM), London (1871-2) and the Bergakademie, Freiburg, Germany. He examined mineral deposits in Newfoundland and Labrador (the summers of 1873 and 1874) and accompanied the explorer Charles Beke to Egypt (December 1873-February 1874).

Meanwhile, the Japanese government had begun recruiting western higher-education teachers. Milne was appointed (possibly on the recommendation of Warrington Smyth at RSM) Professor of Geology and Mining at the newly-established, mainly British-staffed, Imperial College of Engineering, Tokyo. He took up his post in 1876, following an eleven-month journey across Russia, Siberia, Mongolia and China. Apart from his teaching, over the next nineteen years he travelled extensively, advising the Japanese government on coal and mineral deposits, and improving safety standards in mines.

When a severe earthquake affected the Yokohama-Tokyo region on 22 February 1880, Milne's interests switched from volcanoes to seismology. He issued a questionnaire to acquire data, which enabled him to map the earthquake intensity pattern. Within two months, The Seismological Society of Japan (1880-92) was established. Milne became its Vice-President and Editor, contributing two-thirds of the content of the sixteen volumes of its *Transactions*. Aided by his colleagues, engineers Thomas Gray and (Sir) James EWING, Milne developed seismographs capable of quantitatively recording earthquake-wave magnitudes and direction.

Milne investigated earthquake motion; catalogued the temporal and spatial distribution of earthquakes in Japan; found the epicentres of distant earthquakes from the arrival times of *tsunamis* (seismic sea-waves); and recommended building methods to minimise earthquake damage, publishing his work largely in the *Transactions* (1880-89), and reports to the British Association for the Advancement of Science's (BAAS) 'Sub-committee for the purpose of investigating the earthquake phenomena of Japan' (1881-95). Milne's book *Earthquakes* (1886) increased popular awareness of the subject.

In 1881, Milne married Toné Horikawa, daughter of the Abbot of the Hakodate temple of Ganjo-ji, in Tokyo (repeated in a civil ceremony at the British Vice-Consulate, 1895). By the 1890s, with the rise of Japanese seismologists (e.g. Seikei Sekiya and Fusakichi Omori), the need for western expertise was ending. The Seismological Society was wound-up in 1892, and was replaced by the Imperial Earthquake Investigation Committee, with Milne as its only non-Japanese member.

In 1895, a fire devastated the Milnes' home. The couple moved to England where, within three weeks of arrival at Shide Hill House, Isle of Wight, Milne set-up a new seismological laboratory. Aided by the BAAS, a network of world-wide observatories using Milne seismographs was gradually established (50 by 1906). Their data was sent to him for collation. By 1900, Milne had perfected identification

of earthquake origins using the time-distance curves of shock arrival-times and he began to publish maps showing global epicentral locations.

So began the initial development of quantitative seismology. Author of over 200 publications, Milne was elected FGS (1873) and FRS (1887). He was awarded the Lyell Medal, (Geological Society of London, 1894); D.Sc. (Oxford, 1906); Royal Medal (Royal Society, 1908); and Order of the Rising Sun (3rd class; Japan, 1895).

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