Actuary of the millennium?

Shane Whelan sings the praises of Dr Edward Sang.

First lecture series to students of Faculty of Actuaries, E Sang, 1857

A Outline of the History of Assurance against Casualties. Rise and progress of Tontines, Benefit Societies, Sick Societies and Assurance Associations in General.

B The Commercial, Moral and Social Influences of Assurances – the applicability of the principle in different circumstances.

C The History of Unsound and Fraudulent Schemes, and the Characteristics which distinguish them.

D The data on which the Calculations are founded. Mortality Registers. Effects of different Rates of Interest and different Mortality Tables, in framing tables of Rates and in making Valuations.

LOGARITHMS BELONG TO THE first half of our profession's history, the half shared with Dickens's *Hard Times* of the smoking chimney stacks, pounding steam engines, and dark canals. The apprenticeship of the early actuary, log tables in left hand and pencil scribbling in right, does not strike us as appealing – that is, until it is compared to the alternative toils of that grim time.

It is not so odd then that there is no word to describe a person who loves calculating log tables. Yet such a word is needed to describe two of the 38 gentlemen who constituted the Faculty of Actuaries in January 1856. But Ebenezer Erskine Scott and Edward Sang were not equals in their devotion; for Mr Scott it was just an infatuation, but Dr Sang had it bad.

Teaser

The numbers are mind-numbing. Edward Sang, in his terse introduction to *A New Table of Seven Place Logarithms of all Numbers from 20,000 to 200,000* claimed to have done more calculations than the previous two great original works of log tables (Briggs' Tables of 1624 and Vlacq's tables of 1628) from which all the others had been derived. Sang, single-handedly and without recourse to any existing tables, calculated the log of the numbers from 100,000 to 200,000 to at least 15 decimal places (which he truncated for publication). But these tables of 1871, commissioned by the Associated Life Insurance Offices in Scotland, were just a tease. A note at the back of the tables requested the support of 'all interested in the advancement of exact science' to help defray the publication costs of the *Million Table of Nine-Place Logarithms* of three volumes, each of three parts.

These ambitious calculations were not completed before Dr Sang's death in 1890, despite the aid of his daughters when his strength ebbed. They got to 370,000. Every calculation was checked three times and the results carried to at least 15 decimal places. Dr Knott, general secretary of the Royal Society in Edinburgh in the early part of this century, once urged the publication of part of the manuscript tables which the Sang family gifted to the society. He estimated that it was possible to produce part of the beautifully scripted numbers, giving the 28-figure logarithms of 0–10,000 and 15-figure tables in the range 100,000 to 200,000, 'conveniently' in a single volume of more than 1,000 pages. Professor Andoyer viewed the work as the fundamental basis for all future tabulations of logarithms.

Progress

Time, with a bit of effort, has developed the technology that makes logarithms unexciting. Dr Sang published some other books that could more quickly (but scarcely more accurately) be computed today – for instance, the *Time Conversion Tables* (mean solar to sidereal and back again for every tenth second during 24 hours) and two volumes of life assurance and annuity tables. Yet Dr Sang's life's work is not undone. His great contribution from our standpoint was to help define the term 'actuary' so well that it could survive when so little else did. He was a founder member of the Faculty, its first lecturer and its consultant on the early examinations. His first four lectures (see box) set in train the perpetual occupation of actuaries.

One thing that cannot not be figured out from thumbing through log tables is the man behind the numbers. At the 1914 Napier Tercentenary Exhibition when 47 manuscript volumes of his calculations were displayed 'all who looked carefully into them must have been greatly impressed with the power of the calculation and tenacity of purpose which enabled their author to leave behind such a mass of accurate figuring'. This is a poor obituary to any actuary. The exhibition displayed only a caricature of a man who went to extraordinary ends to relieve others of the burden of calculation.

Dr Edward Sang

Dr Sang published more than 100 books and papers. He made that difficult transition from child prodigy (attending university at the age of 13, etc) to productive adult. He was a professor of Mechanic Science (at Manchester and at Muhendis-Hana Berii, Constantinople) in the heyday of that science. Yet for all his accomplishments there is a hint of disappointment about his life. In 1837 he read a paper to the Royal Society in Edinburgh entitled 'Investigation of the Action of Nicol's Polarising Eye-piece'. Unaccountably, it was not published nor even mentioned in the proceedings. Dr Sang, when reviewing his life near its close, confided in Professor Tait that he thought this paper his best contribution to science. It was published in 1891, posthumously and a few decades after it could influence developments in that area. ❑

Shane Whelan works for Friends First in Ireland