Hammersley, John Michael

(1920–2004)

Hammersley, John Michael (1920–2004), mathematician, was born on 21 March 1920 at Dee Bank, Helensburgh, Dunbartonshire, the only child to survive childbirth of Guy Hugh Hammersley (1883–1964), a businessman in the steel industry, and his wife, Marguerite, *née* Whitehead (1889–1949). After four years at Waterside School in Bishop's Stortford and a short stay at Bembridge School on the Isle of Wight, he was sent in 1930 to Stratton Park near Bletchley, Buckinghamshire, where he learned the rudiments of Euclidean geometry, algebra, and trigonometry, but no calculus, under the guidance of Gerald Meister. He gained a scholarship to Sedbergh School where he spent the pre-war years from 1934 to 1939. He found the mathematics teaching at Sedbergh to be sound but not exceptional, and remarked later that his teachers were unable to explain how a function could be continuous but non-differentiable everywhere. He went to Emmanuel College, Cambridge, in 1939 with a minor scholarship, and gained an uncharacteristic third class in the first year of the mathematical tripos, before being called up for military service in the Royal Artillery.

Following a period as a gunner and later as a lance-bombardier, Hammersley was sent for officer training, and was commissioned as a second lieutenant in 1941. His career as a problem-solver appears to have begun with his assignment to an anti-aircraft gun site near Worsham, Oxfordshire, where he became interested in the use of radar as a tool to predict the flight paths of enemy aircraft. After working on the installation of radar at the gun sites defending Scapa Flow, he was transferred to the trials wing of the School of Anti-Aircraft Artillery at Lydstep, Pembrokeshire, where he introduced a number of valuable reforms, including the use of polar co-ordinates and improved numerical and statistical techniques. By the end of the Second World War he had been promoted to the rank of major.

Post-war Cambridge was a changed place, and Hammersley was better motivated on his return in 1946. He graduated as a wrangler in the mathematical tripos in 1948. Rather than continuing to a PhD, he accepted the post of graduate assistant in the group working in the design and analysis of scientific experiment headed by David Finney at Oxford University. There his duties included statistical consultancy and teaching. On 14 June 1951 he married Shirley Gwendolene (Gwen) Bakewell (*b*. 1918), a physiotherapist, and daughter of William Kenneth Bakewell, barrister. They made their permanent home at Willow Cottage on the Eynsham Road, Oxford, where their sons Julian and Hugo were born in 1954 and 1956.

In the year of his marriage Hammersley was appointed lecturer in mathematics at Trinity College, Oxford, following the return of Patrick Moran to Australia. His ensuing association with Trinity endured to the end of his life. From 1955 he was principal scientific officer at the Atomic Energy Research Establishment at Harwell until his return to Oxford as a senior research officer three years later. He was elected to a senior research fellowship at Trinity in 1961. In 1969 he was promoted to a university readership in mathematical statistics and elected to a professorial fellowship at Trinity, two posts which he held until his retirement in 1987.

John Hammersley was an exceptionally inventive mathematician and a fearless problem-solver. He had the rare ability to identify the basic mathematics of a scientific problem, and to develop an applicable theory. His most outstanding achievements were in the two areas of spatial disorder and Monte Carlo methods, and his scientific legacies in these important fields proved extremely influential. Problems of spatial disorder arise through the random interaction of a large number of particles spread around a space, and the most fundamental model is arguably the 'percolation model'. The mathematical theory originated in the work of S. R. Broadbent on the movement of particles through the filters of gas masks, and percolation subsequently became the standard model of probability and statistical mechanics for a disordered medium. Hammersley embarked on a systematic theory of percolation and its phase transition, and established many of the principal results and techniques that later guided the theory of spatial disorder. He pioneered the use of 'subadditivity' in stochastic and combinatorial geometry, including the counting of self-avoiding walks and lattice animals. Among his most significant methodological advances was the introduction (with Dominic Welsh) of the theory of so-called 'subadditive stochastic processes', primarily in the context of time-dependent percolation, and this tool was later developed further and applied by others in a number of areas of scientific significance.

From early in his career, Hammersley sought methods for carrying out large numerical computations using limited computing machinery. In the early 1950s he learned of the Monte Carlo methods used earlier at Los Alamos, and he was attracted strongly to the field. The basic idea is that one may estimate a quantity through computations involving random numbers. Hammersley's work had great impact on the solutions of practical problems. His most significant individual contribution (jointly with K. W. Morton) was the introduction of the method of antithetic variables, which permits more accurate estimates through the use of correlated random variables. His volume (*Monte Carlo Methods*, published in 1964 with David Handscomb) became a standard work of reference for practitioners in finance and elsewhere.

Great changes were made during Hammersley's lifetime to the teaching of school mathematics, and he was instrumental in the reforms that led in 1961 to the School Mathematics Project (SMP). However, the SMP disappointed him by its emphasis on abstraction at the expense of concrete problems, and he continued to champion the primacy of problem-solving in secondary and higher education. During his career he held visiting positions at Princeton University, the University of Illinois (Urbana), Bell Laboratories (Murray Hill), and the University of California (Berkeley). He was awarded an ScD by Cambridge University (1959), the von Neumann medal for applied mathematics by the University of Brussels (1966), the gold medal of the Institute of Mathematics and its Applications (1984), and the Pólya prize of the London Mathematical Society (1997). He was elected to a fellowship of the Royal Society in 1976. Following his retirement in 1987, he spent several fruitful years at the Oxford Centre for Industrial and Applied Mathematics. John Hammersley died on 2 May 2004 at the John Radcliffe Hospital, Oxford, from pneumonia and cerebrovascular disease. He was cremated on 10 May at the Oxford crematorium, following a memorial service in the chapel of Trinity College, and was survived by his wife and two sons.

Sources

- G. R. Grimmett and D. J. A. Welsh, introduction, *Disorder in physical systems: a volume in honour of John M. Hammersley* (1990)
- *The Independent* (14 May 2004)
- *The Times* (20 May 2004)
- G. R. Grimmett and D. J. A. Welsh, 'John Michael Hammersley (1920–2004)', *Memoirs FRS*, 53 (2007), 163–83
- *WW* (2004)
- personal knowledge (2008)
- private information (2008)
- b. cert.
- m. cert.
- d. cert.

Likenesses

- obituary photographs
- photograph, repro. in Grimmett and Welsh, *Disorder in physical systems*

Wealth at Death

£1,142,680: probate, 13 Sept 2004, *CGPLA Eng. & Wales*