William G. Bickley—An appreciation

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The death of Professor W. G. Bickley marks the loss of an outstanding mathematician, educator and computor after a long career dedicated to the teaching and application of mathematics.

He was born in 1893 and, despite visual defects which were to be a life-long difficulty, he obtained a scholarship to University College, Reading. There he graduated with a first class honours degree in Mathematics in 1913. After a period of school teaching he was appointed lecturer at Battersea Polytechnic, then in 1929 he received a D.Sc. from the University of London and also joined the staff of Imperial College, where he remained until his death in June this year.

His primary concern was the teaching and application of mathematics, and he derived particular satisfaction in bringing mathematical tools to engineers. Until he went blind in 1949 he was responsible for the teaching of mathematics to engineering students. The onset of total blindness at the age of 56, two years after being appointed to a chair of Mathematics, deprived him of many of the formal rewards of his distinguished career, although it only temporarily interrupted his teaching, consulting, writing and research. During the later years, he was Professor Emeritus and Research Fellow at Imperial College, and was a part-time consultant to both the Department of Mechanical Engineering and the University of London Institute of Computer Science. In addition, he was the holder of an IBM fellowship in the Centre for Computing and Automation.

Professor Bickley was the author of more than fifty papers and books in the fields of applied mathematics, tables of mathematical functions, and numerical analysis—where his work established some of the foundations of the field. His earliest papers between the wars were concentrated on problems of hydrodynamics and elasticity. He soon recognised the importance of numerical techniques in solving such problems and developed an interest in computing which he maintained for the rest of his life. His knowledge and experience of computing were used throughout the Second World War under the auspices of the Mathematical Tables Committee of the Royal Society. During that time he also made major contributions to numerical solutions of differential equations and finite difference methods

(Bickley, 1932, 1939, 1941, 1948a). Later he was led to systematise finite difference operators, and to consider errors in the use of finite difference approximations (Bickley, 1948b). All this work was published in a series of papers dating from 1939 to 1961. Recently he also experimented with the use of splines and finite element techniques for solving differential equations. His passion for practical applications was centred on the very difficult areas of free and moving boundary problems during the nineteen sixties. He was invited to address the Seminar on Nonlinear Problems of Engineering held in 1963 at the University of Delaware (Bickley, 1964).

Although we cannot attempt to appraise all of Professor Bickley's work here, it is curious to note that pieces of one of his more important contributions, done in collaboration with J. McNamee (Bickley and McNamee, 1960), are continually being independently rediscovered. Mr. R. Osborne (Osborne, 1965) described that paper as follows: 'In the author's opinion they (the techniques of Bickley–McNamee) provide the best numerical method for the problems for which they are suitable'.

Professor Bickley's work is characterised by an elegant simplicity. Although fully aware of the niceties of mathematical rigour, he would often produce ingenious arguments to put across a clear and intuitive picture of the points he wished to make. Only if these arguments could not be fully justified, would he give formal proofs. This was only one aspect of his brilliant insight. The many people who consulted him for help were often amazed at the speed with which he grasped the essential features of their problems, and his unerring ability to pinpoint troubles. Some of these attributes shine through in his books, which are all aimed at applied scientists, engineers and technologists.

The late Professor Bickley was a man of outstanding humanity and sensitivity. He was always warm and considerate, and thoroughly enjoyed meeting and talking to people. When discussing problems, he would point out errors and suggest new approaches with the kindly, almost diffident thoughtfulness which was his hallmark. He possessed a deep sense of humour and was entirely free of any pomposity, but was a formidable opponent in frequent bantering sessions. Yet he was never known to have made a disparaging remark about anyone.

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Professor Bickley possessed tremendous personal courage, fortitude and drive. After going blind at the age of 56 he kept abreast of current developments in his many fields of interest by making braille notes of papers and books that his students and friends read with him. He was never stultified and even learned to be a competent programmer at the age of 73, so that he could appreciate better what his research students were doing.

In addition to all his work at the College and the University, Professor Bickley took an active part in many organisations. These included the London Mathematical Society and the BCS and he was one of the founding fellows of the IMA. Furthermore, he held several important positions in the RNIB and was a major contributor to the development of the British braille mathematics code. With all of these solid accomplishments, Professor Bickley held only the modest desire to be remembered as a teacher who tried to be a bridge to bring the powerful tools being developed by mathematicians to the real problems facing the working technologist.

References

BICKLEY, W. G. (1932). A Simple Method for the Numerical Integration of Differential Equations, *Phil. Mag.* (7), XIII.

BICKLEY, W. G. (1939). Formulae for Numerical Integration, *Math. Gaz.*, XXIII, pp. 352–359.

BICKLEY, W. G. (1941). Experiments in Approximating to the Solutions of a Partial Differential Equation, *Phil. Mag.* (7), XXXII, pp. 50–66.

BICKLEY, W. G. (1948a). Finite Difference Formulae for the Square Lattice, *Q.J.M.A.M.*, Vol. I, Part I, pp. 35–42.

BICKLEY, W. G. (1948b). Difference and Associated Operators with some Applications, *Jour. Math. & Phys.*, Vol. XXVII, No. 3, pp. 183–192.

BICKLEY, W. G., and MCNAMEE, J. (1960). Matrix and Other Direct Methods for the Solution of Systems of Linear Difference Equations, *Phil. Trans. Roy. Soc.* A, No. 1005, Vol. 252, pp. 69–131.

BICKLEY, W. G. (1964). Some Problems Concerning Linear Differential Equations Made Nonlinear by Unknown or Moving Boundaries, *Nonlinear Problems of Engineering*, Academic Press, ed. by W. F. Ames.

OSBORNE, M. R. (1965). Direct Methods for the Solution of Finite-Difference Approximations to Separable Partial Differential Equations, *The Computer Journal*, Vol. 8, No. 2, p. 150.