DEREK ARTHUR WALLER

N. L. BIGGS

From 1973 onwards I met and talked to Derek Waller on many occasions. If I had been asked to describe the essence of his personality, I should have said that he was 'full of life'. The news of his death from leukaemia on 23rd June 1978 seemed almost unbelievable. He left a devoted wife, Sue, and three children.

Derek Arthur Waller was born on 19th June 1941 at Dinnington, a village near Sheffield. He attended Dinnington Primary School and Maltby Grammar School, and in October 1959 he went to read Mathematics at the University of Liverpool. Although he achieved only moderate success in his B.Sc. degree examinations, Professor A. G. Walker considered that he had the makings of a research mathematician, and asked R. Brown (then a recent D.Phil., now Professor at Bangor) to be his supervisor. The research project was in algebraic topology.

In 1965 he left Liverpool to take up an appointment as Assistant Lecturer at Swansea, where he was made Lecturer in 1967. During this time he continued to work on his Ph.D. thesis, and it was eventually submitted in June 1967. After some mistakes had been corrected the thesis was resubmitted in December 1968 and the degree was awarded.

Derek Waller was a lively and respected member of the Department of Pure Mathematics at Swansea. His administrative talents were soon recognised and put to good use, and, more significantly, he began to develop as a mathematician in his own right. In 1969/70 he played a major part in a seminar on category theory and was co-author of a set of lecture notes entitled 'An introduction to categories and the representation of functors'. Around this time he also became interested in the applications of linear algebra in graph theory. Thus, beginning in 1973, he produced a steady stream of publications in which ideas from category theory, algebra and graph theory are intermingled. He lectured at conferences in Rome, Amsterdam and Paris, and at the British Combinatorial Conferences held in Aberystwyth (1973), Aberdeen (1975) and Royal Holloway College (1977). Because of the neatness of his work, and his attractive style of presentation, his talks were always among the highlights of these occasions.

He was looking forward to the British Conference in Swansea in 1981, which he was to have organised. The conference will now be dedicated to his memory.

Derek Waller's attitude to mathematics was a reflection of his realistic and balanced approach to life in general. He felt that so-called pure mathematics could be useful and important in other branches of scholarship, in addition to being a supremely intellectual activity.

The subject of his thesis was a generalisation of the concept of a fibre bundle. Roughly speaking, the idea was to assume that the inverse image of an open set in the base space is homotopically equivalent (rather than homeomorphic) to a product. The fibre homotopy equivalence classes of such things were classified in terms of homotopy classes of maps into a classifying space, constructed using the

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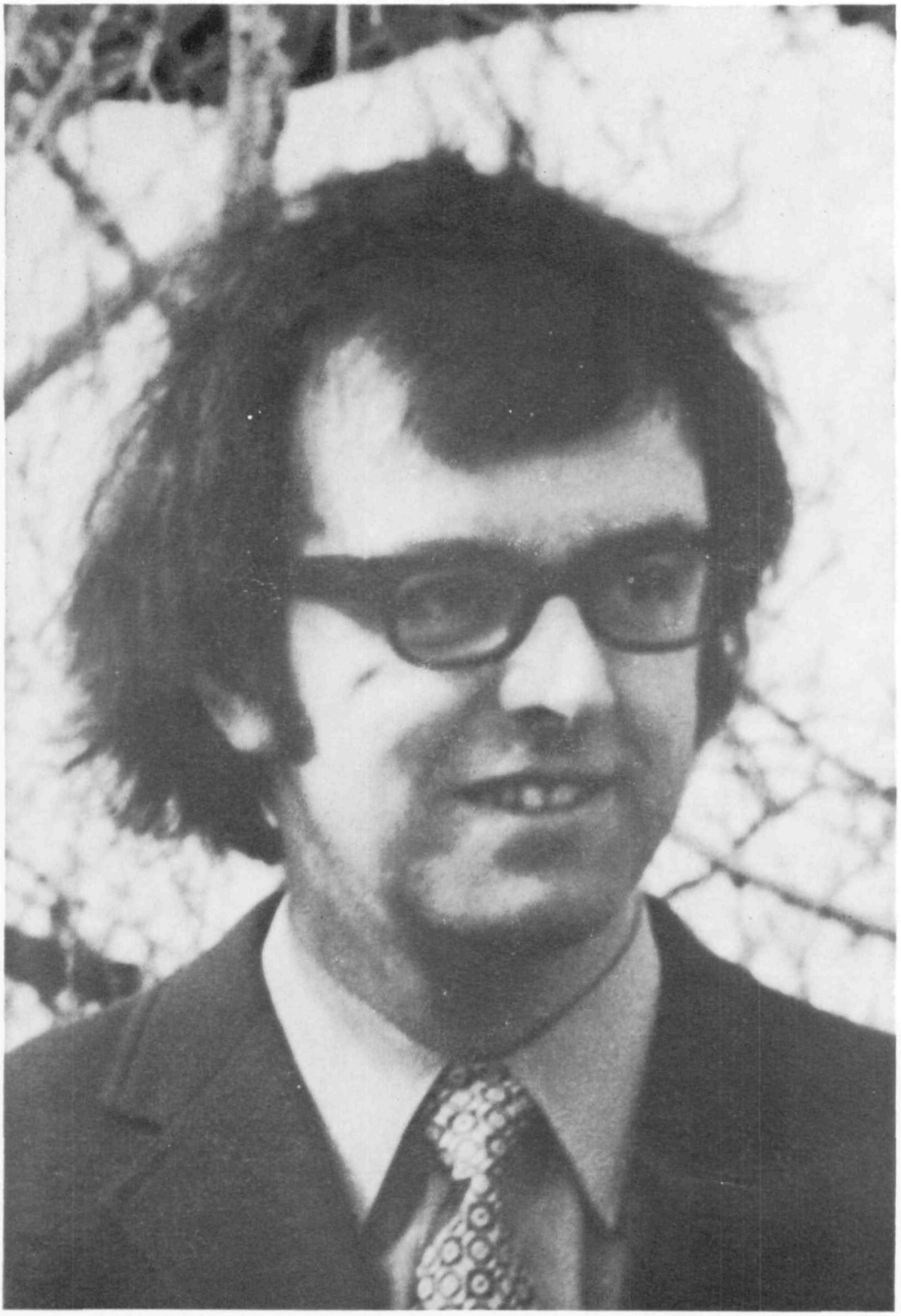

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half-exact functors of A. Dold. In the process, some variants of the weak covering homotopy property were developed. This led directly to his first publication [1], and indirectly to a series of papers [2, 4, 5, 6, 8, 12, 15] in which categorical constructions are used in the context of graph theory. Concurrently, he wrote papers [3, 9, 10, 11, 14] concerned with the properties of the adjacency matrix of a graph: the paper [11] is a particularly attractive synthesis of geometric and algebraic methods, applied to clique numbers and interchange graphs. The interplay between abstract ideas and their geometrical realisation was also the motivation for his work on the imbedding of graphs in surfaces [13, 20].

In his last years he became interested in applications of graph theory, particularly in chemistry [10, 18, 19] and electrical engineering [7, 9, 16]. His earlier work was ripe for application in these fields. One important problem which concerned him was the estimation of the reliability of the large networks used in telecommunications systems. It seems that it is not possible to give a theoretical analysis in general, but that the problem might be amenable if the networks were constructed by the kind of product operation dealt with in his 'categorical' work. By his training and by his nature, he was attracted to such problems, and it is possibly in this field that his tragic death is the greatest loss to science.

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Publications

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5. "Pullbacks in the category of graphs", *Congressus Numerantium* 15 (Proc. Fifth British Combinatorial Conference, Aberdeen, 1975), Utilitas Mathematica Publ. Inc., Winnipeg, (1976), 637–642. MR 54, 2550.
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20. (with F. W. Clarke and A. D. Thomas) "Embeddings of covering projections of graphs", *J. Combinatorial Theory, Series B* 28 (1980), 10–17.