

George Garfield Hall 1925-2018



Throughout his scientific career George Garfield Hall had an international reputation as a mathematician and theoretical chemist. As a PhD student at Cambridge under the supervision of Sir John Leonard Jones he produced epoch-making work which was accepted for publication in the Proceedings of the Royal Society, known world-wide as the most prestigious scientific journal in which it is possible to publish.

To appreciate his contribution it should be noted that some decades after quantum theory was first formulated as a theory describing the behaviour of atoms and molecules, and while although successful in the thirties in describing smaller atomic and molecular systems, it was too complicated to apply it to theoretical chemistry as a whole. George Hall had the distinction of using quantum theory to put molecular chemistry on a mathematically logical basis. He was responsible for producing what became known as the Roothan equations at approximately the same time that Roothan had also published them, but unfortunately did not then receive equal recognition. History seems to have rectified this, since many theoreticians today refer to them as the Roothan-Hall equations.

George produced, solely and with other colleagues, some one hundred and forty five scientific papers not to mention several books in which he was the sole author. In addition the University of Cambridge awarded him the higher doctorate degree of Sc.D, Doctor of Science. I was reminded of George's eminence when a decade ago we published our last paper when George was then in his eighties: an anonymous colleague who was peer- reviewing it, wrote in his review that this article is written by two authors, one of whom is famous.

I first met Dr George Hall, as he was then, as an undergraduate at Imperial College. He lectured to me on tensor analysis and I was always careful to sit at the front of the lecture theatre in order to see his very tiny little chalked -writing on the blackboard - a writing style that did not change throughout his lifetime.

Before this appointment, he had lectured in theoretical chemistry at Cambridge and, as a result of competition, was made a Fellow of St John's College where he had studied for his Ph.D having arrived as a graduate of Queen's College, Belfast, and having obtained firsts there in both pure mathematics and in mathematical physics.

At Imperial College he had then only recently returned from a year's sabbatical in Uppsala, Sweden working with the distinguished mathematical physicist, Per-Olav Lowdin. After my graduation he invited me to join his newly-formed research group, consisting of Arturo Hardisson, myself, and a former, colleague, Terry Amos, who unfortunately cannot be with us today on account of illness.

George's reputation had preceded him and in 1962 he arrived with his research group at Nottingham, having been appointed to the Chair of Applied Mathematics at Nottingham University. Our research group developed and George, soon to be Head

of the Department faced new responsibilities, for example, as Dean of Pure Science and as a representative of the University on the Derbyshire Education Committee the membership of which instilled into George a life-long interest in Education.

At Nottingham University George's administrative and scientific talents were recognised outside of the City when, for example, he was elected to the International Academy of Quantum Molecular Science not to mention two other national committees one of which was as Chairman of the Joint Mathematical Council, and much later, to the Mathematics Committee of the Council for National Academic Awards.

George Hall was also much sought-after as speaker at International Conferences and was a frequent visitor to the Chemistry Department of Kansas University at the mid-Western town of Lawrence, where a former member of our research group, Dr Ralph Christofferson had been appointed Professor. On one such occasion, I was privileged to accompany him when we were both assigned to teach graduate courses in Quantum Theory.

Earlier I mentioned George's involvement with education. This came at a time when the "new maths" was being introduced into schools and many of the teachers were finding problems with it. He, together with Prof Heini Halberstam, his colleague in pure mathematics, therefore decided to establish in-service courses. So with the help of the then Vice Chancellor, the late Lord Dainton, financial help was obtained from the Shell Company to provide additional staff to help with this work. Thus the Shell Centre for Mathematical Education was formed and continues within the University to this day designing as it does teaching materials for schools.

Related to this in-service work and as an applied mathematician George was firmly committed to mathematical modelling in which real-live situations in many different walks of life can be modelled mathematically and, through the related equations, outcomes predicted. In fact he produced some sixty papers in mathematical education many of which were in his retirement and were published in various Bulletins of the Institute of Mathematics on subjects ranging from fuel consumption to mortgage repayments.

It was in 1981, that George Hall, conscious of the savings that University Departments were asked to make magnanimously decided to take early retirement to ease the pressure then being put on his colleagues. In 1982, after a transition year he received a number of overseas job offers and decided to accept the offer from Kyoto University to head the quantum molecular science section in a new department of molecular engineering thereby making him one of the first, if not the first, non-Japanese civil servants in the Country. George enjoyed his time there immensely and claimed it was the most productive time in his life. In recognition of his work, he was delighted to be awarded by Kyoto University their first honorary doctorate of D.Eng.

After his return to Nottingham, George was in demand on National Committees, as a Conference speaker, and in his involvement as an Emeritus Professor at Nottingham University. In addition as the then Warden of Hugh Stewart Hall, I was delighted to welcome him into the life of the Hugh Stewart External Senior Common Room. And nor did he neglect his research: he specifically enjoyed collaborating with Prof Gerd Dierkson in Munich, and I had the enormous honour and pleasure of working with

George until after my retirement, and indeed up until he was in his late eighties. During this time George was further honoured to receive his second honorary doctorate of D.Sc from the National University of Ireland.

Friends, I am proud as a colleague and friend to have been given the opportunity by George Hall in his will to review his career; and what a career it was! Scientist, mathematician, quantum chemist, educator, administrator, author; in short, he was truly internationally renowned. I conclude by quoting a comment made by, Prof Ralph Christofferson, on hearing the sad news of George's death, "the world of theoretical chemistry has lost a giant".