BIOGRAPHICAL MEMOIRS

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J. P. Elliott

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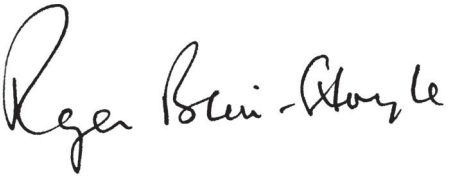

ROGER JOHN BLIN-STOYLE

24 December 1924 — 31 January 2007

Elected FRS 1976

By J. P. Elliott FRS

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Roger Blin-Stoyle was primarily a theoretical physicist who worked in the borderland between theories of the structure of atomic nuclei and theories of the interactions and relationships between the elementary particles from which nuclei are built. He made world-class contributions. But he was also driven by a desire to improve the communication of science in general and physics in particular, at all levels. This led him to accept an offer to become the founding Dean of Science at Sussex, the first of the 'new' universities, and later to chair a number of national bodies including a committee responsible for reviewing the science curriculum in schools. Less well known was his accomplishment as a pianist and organist.

Family background

The hyphenated name 'Blin-Stoyle' is of comparatively recent origin, having been created by deed poll by Roger's paternal grandfather, the Rev. Bernard William Blin-Stoyle MA (Cantab.), who combined the surname Stoyle of his father with the maiden name Blin of his mother. The Blins were of Huguenot descent. Like many 'men of the cloth' of his time, Bernard William was an amateur scientist with special interests in chemistry and astronomy. He was clearly a 'seeker after the truth' in his profession, having been, successively, a Free Church minister, an Anglican priest, a Roman Catholic layman and, again, an Anglican priest.

Roger's father, Cuthbert Basil St John Blin-Stoyle, was only 14 years old when Bernard William died, virtually penniless, and it was necessary for him to seek employment, having had very little formal education beyond that received from within the family. He worked on the shop floor of the Brush Electrical Engineering Company in Loughborough and attended evening classes. After service in the Royal Engineers in World War I, during which he

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achieved the rank of Staff Sergeant, he returned to 'the Brush'. After his marriage to Ada Mary Nash in 1923, he worked as a driver and later as driver's foreman, for the Birmingham and Midland Omnibus Company.

Early years

Roger's early upbringing was in a typical working-class household, first in Wigston Fields and then in Glen Parva, both on the outskirts of Leicester. But it was enriched by the encouragement in music from his mother, an amateur singer, and in all things electrical from his father, who brought home into his workshop the enthusiasm and knowledge of electrical matters acquired in his work and in the army. For example, his mother would pump for him on a two-manual reed organ that they had acquired for Roger when he was about 13 years old. At about the same age, Roger used a Bosch magneto, one of his father's relics from a crashed German World War I aeroplane, to make a lighter for the family gas cooker. It was in use for many years. Inspiration came also from the man next door, known to Roger only as Lewis, who was a shortwave radio enthusiast and taught Roger to build radio sets.

Roger's primary school, at South Wigston, was typical of its time in providing good basic mathematics, including the rhythmical recitation of tables, and literacy but virtually no science, apart from a little nature study. Piano lessons, taught by a near-neighbour, began at about the age of six years, closely supervised and encouraged by his mother. The local church, St Thomas's in South Wigston, was also a significant feature in Roger's life at this time. He was a member of the choir from a young age. He joined the Church Lads' Brigade and later the Anglican Young People's Association, which were to become the focus of his social life until the age of 18 years.

At 10 years of age, Roger was successful in the Leicestershire County Scholarship examination, winning free entry to one of the Leicester grammar schools. On the friendly advice of his family doctor, Roger applied to the Alderman Newton's Boys' School and was accepted to start his secondary education in September 1935.

Grammar school

Alderman Newton's, founded in 1784, had a strong academic tradition and its old boys included J. H. Plumb (historian), Leslie Weatherhead (theologian) and C. P. Snow (scientist and novelist). Although Roger was placed in the top stream, his first four years at grammar school were undistinguished, with a form position about two-thirds of the way down. He did not find the physics at all exciting, and his one and only prize was in English. One bright spot was the enjoyable, but rather chaotic, physics teaching from Harry Hoff, a Cambridge graduate and a protégé and admirer of C. P. Snow. (Hoff went on to become a civil service commissioner and a novelist under the pen name William Cooper. His *Scenes from provincial life* is set in Leicester and encompasses Alderman Newton's.) Roger's interest in science during this period was still mainly focused on his shed at home. Meanwhile, his musical life was developing fast, with organ lessons from the organist, Miss Violet Moore, at All Saints, Wigston Magna, and he was soon playing the organ for services at his local church and for assemblies and concerts at school.

Roger spent four years, 1939–43, in the sixth form and although the school at first suggested that he should join the arts sixth form there was no doubt in Roger's mind that he wanted science.

Fortunately for Roger, the sixth-form physics teaching was in the hands of a newly appointed teacher, Bill Davis, who had done some research for an MSc and was described by Roger as a 'bulky rugger-playing Cornishman'. For the first time, physics became exciting and the boys were encouraged to read more widely and to help in building apparatus for use in lower classes. At last, the science from Roger's shed and the science in the classroom had begun to come together. The quality of this sixth-form teaching is confirmed by the fact that, in addition to Roger, two other members of his class, Leslie Green and Douglas Heddle, became heads of university physics departments. Roger enjoyed a happy relationship with his mathematics teacher, the Rev. Tom Pickering, who was also strongly supportive of his musical activities.

Having taken the Higher School Certificate in 1942, Roger was offered a place at the University College, Leicester, to take a two-year 'war degree' in physics but he decided to stay on for another year to try for an Oxford or Cambridge scholarship. In fact, he entered for both the Science and Organ Scholarships but withdrew halfway through the latter when news came through that he had been awarded a Senior Scholarship in Natural Science at Wadham College, Oxford. Had he gained entry to Oxford on the Organ Scholarship he would nevertheless still have intended to study physics. Conscription into the armed forces was compulsory in 1943 and, having turned down the offer of a war degree at Leicester, Roger was duly called up into the army in September 1943.

Army service

After a traumatic six weeks of primary training in Fulford Barracks, York, Roger was assigned to the Royal Corps of Signals and sent on a course for radio operators at Catterick garrison in Yorkshire, which included learning Morse code. He was soon promoted to the rank of 'local unpaid lance-corporal' and recognized as potential officer material. After a nine-month training course for officers in the Royal Corps of Signals, Roger was commissioned in April 1945 but, fortunately, the war was coming to an end. Soon after VE Day he was posted briefly as signals officer with the Guards Armoured Division in a devastated Cologne before coming back to Catterick for a three-month advanced wireless course during which the war with Japan also came to an end.

The remainder of Roger's army service was spent in India as an Officer Instructor in the Signals Training Centre at Mhow. It was valuable experience, at an early point in his career, in lecturing to very diverse audiences of both British and Indian participants with a wide range of abilities. Life in the officers' club was also good. He was released from the army in September 1946 in time to take up his Oxford scholarship. On the sea voyage home he spent much of his time learning Latin in the expectation of having to take an examination in the subject on entry to Oxford, only to discover that his three years in the army gave him exemption from the requirement.

Oxford undergraduate days

On the advice of T. C. Keeley, the Senior Tutor at Wadham, Roger took Mathematical Moderations in his first year, obtaining first-class honours. He enjoyed lectures from W. L. Ferrar, T. W. Chaundy and U. Haslam-Jones and was tutored by J. H. C. Thompson, who had worked in the past with Max Born. An especial bonus in his first year was to meet his future wife,

Audrey Elizabeth Balmford, a mathematics student at St Hugh's, who was also attending some of the lectures. In his second year Roger was tutored by T. C. Keeley, who was, at that time, the Director of the Clarendon Laboratory, which had Lord Cherwell (R. A. Lindemann) FRS as its Head. Keeley had worked with Lindemann in the past. (Roger recounted his concern at his first tutorial on seeing a revolver tucked under a cushion in Keeley's room. Apparently it was to deal with a mouse that had been seen in his room earlier.) Although Keeley was an extremely helpful tutor, he limited his teaching to classical physics, suggesting that quantum mechanics should be left until the third year. However, he recognized Roger's impatience to engage with some modern physics and arranged for additional tuition from J. S. de Wet, a mathematical physicist and Fellow of Balliol College. Not only did this introduce Roger to quantum field theory and the works of J. von Neumann at an early point in his career but the tutorials were, in Roger's words, 'lively, exciting and inspiring'. Roger attributes much of the credit for the First that he gained in Finals in 1949 to the careful tutoring in his third year from J. H. Sanders, then a research fellow and later Physics Fellow at Oriel College. On 30 August 1949 he married Audrey.

Postgraduate studies

Roger was keen to move on to postgraduate work in theoretical physics. At that time, most theory students in Oxford were recruited from mathematics, but in view of Roger's First and the fact that his Further Education and Training grant could be continued, the Wykeham Professor of Theoretical Physics, M. H. L. Pryce (FRS 1951), arranged for J. A. Spiers to act as supervisor. John Spiers had recently returned from the Chalk River Laboratories in Canada, which had been involved in the wartime work for the atomic bomb. These were still early days in nuclear physics and there were many avenues to explore. Spiers had been working on the directional emission of radiation from polarized radioactive nuclei, and he proposed that Roger should extend this work to nuclear reactions in which either the incident particle or the target nucleus, or both, were polarized. Roger completed this project in little more than a year, whereupon Spiers set him a new problem, the general formulation of β-decay theory, including the various 'forbidden' transitions. His thesis was therefore in two quite separate parts and the work was published in several papers, jointly with Spiers. The fundamental nature of both problems is clear from the titles of the two papers, 'Polarised nuclear reactions' (1)* and 'Beta-decay theory', which appeared in two parts (2, 3). Roger recounts that a significant part of his *viva voce* examination was taken up by an argument between the two examiners, R. E. (later Sir Rudolph) Peierls FRS and J. S. de Wet on a technical point.

Early research at Oxford, Birmingham and Massachusetts Institute of Technology, 1951–62

Roger stayed at Oxford after completing his DPhil, having been awarded a two-year Pressed Steel research fellowship. He interacted immediately with an experimental research group led by Hans Halban at the Electrical Laboratory and virtually became their 'house' theoreti-

* Numbers in this form refer to the bibliography at the end of the text.

cian. The group also contained Leon Beghian, George Bishop and John Westhead. They were studying the collision of deuterons on deuterons with special interest in the polarization of the emerging neutrons and protons, the reactions $D + D \rightarrow {}^3H + p$ and $D + D \rightarrow {}^3He + n$. Halban was a man of considerable experience, having worked on nuclear fission in the very early days. He was also responsible, together with L. Kowarski, for bringing the world's supply of heavy water (D_2O) out of France in 1940, in the early stages of the war. Roger described him as a rather exotic character who lived in Headington Hill Hall, later occupied by Robert Maxwell, and gave grand pre-colloquium lunches for distinguished visiting speakers. Roger's work in the first part of his thesis was immediately relevant to the analysis of Halban's D–D work and led to several joint papers (5, 7). This early experience of fruitful interaction with experimental groups was to be the keynote for much of Roger's later work.

The Mathematical Physics Department at the University of Birmingham was rapidly becoming a centre for nuclear physics at this time, led by Rudi Peierls, one of Roger's DPhil examiners. The department contained the (now) famous figures of Sam (later Sir Samuel) Edwards (FRS 1966), Gerry Brown and Paul Matthews (FRS 1963), and Roger was lucky to spend a year there as a lecturer in 1953. With encouragement from Peierls, Roger turned his attention to the calculation of nuclear magnetic moments. These were comparatively easy to measure and depended strongly on the nuclear wavefunction. They were therefore very useful in testing models of nuclear structure. Of particular interest was the shell model, in which each nucleon was supposed to orbit independently in the average nuclear field of all other nucleons. Although this model had been used since the very early days of nuclear physics, it had gained much greater prominence in 1949 when a strong spin–orbit component was added to the nuclear field. One of its successes was the prediction of magnetic moments, the so-called Schmidt lines, and attention turned to the deviation of measured values from the Schmidt lines. Together with M. A. Perks, Roger wrote several papers (4, 6) on this topic, followed by a review (8) and a book (10) in 1957. Significantly, the book included a substantial chapter on the different experimental techniques for measuring moments.

After only one year in Birmingham, Roger returned to Oxford as a Senior Research Officer in Theoretical Physics. He soon began collaborating with Michael (M. A.) Grace (FRS 1967), who led an experimental group in the Clarendon Laboratory making measurements on nuclei that had been polarized at low temperature. Roger was able to bring to this work his experience from earlier studies of polarization with Halban. A substantial review on oriented nuclei was published jointly with Grace in *Handbuch der Physik* (9). At about this time, in 1956, Lee and Yang had suggested that parity was not conserved in some (the weak) nuclear interactions (Lee & Yang 1956), a proposal that could have been tested in Oxford by Grace's group. Roger confesses that he, together with many others, including Wolfgang Pauli ForMemRS, was sceptical of the suggestion and there was no urgency in Oxford to carry out the experiment. In the event, a group at the National Bureau of Standards in the USA was the first to carry out the crucial experiment to verify Lee & Yang's proposal. The Oxford group were only able to confirm the result. Roger discusses this episode in some detail in the Biographical Memoir (27) for Michael Grace, which he wrote in 1989.

The Atomic Energy Research Establishment (AERE) at Harwell is only a few miles from Oxford and, although its main function was to support the development of nuclear power, some basic science was also pursued in various Divisions, including the Theoretical Physics Division. There was considerable interaction between that Division and the theorists at Oxford. People from AERE attended seminars and occasionally gave postgraduate courses in Oxford

while some Oxford people, including Roger, spent several weeks at AERE in the summer, working with the people there. In particular, Roger worked with John (J. S.) Bell (FRS 1972), a physicist and philosopher of great depth and charm who was later to become a key theorist at CERN in Geneva. This collaboration led to a joint paper (11) on mesonic exchange effects in β-decay, and Roger's work in this area continued with a joint paper with Henry Primakoff (from Washington University, St Louis, USA), who was visiting Oxford in 1958.

At about this time Roger also interacted with Vicki (V. F.) Weisskopf from Massachusetts Institute of Technology (MIT), who spent a term at Oxford. Weisskopf had been offered the Wykeham Chair of Theoretical Physics at Oxford when Maurice Pryce moved to the chair of physics at Bristol in 1954. In the event, he decided not to come to Oxford but, although they wrote no joint papers, Roger said that he learnt a lot of physics from Weisskopf during that term. The visit was also enjoyable musically because Weisskopf was also an accomplished musician and Roger tells how Weisskopf would play piano concertos accompanied by Roger on the organ in the Wadham Chapel.

Roger's position in Oxford was strengthened in 1956 when he was appointed to a Tutorial Fellowship at Wadham, having turned down various offers of positions elsewhere. In the following year, Denys (later Sir Denys) Wilkinson FRS moved from Cambridge to the new chair of nuclear physics at Oxford. His interests were turning from the measurement of nuclear properties *per se*, such as the spins and parities of nuclear energy levels, to the use of nuclei to investigate properties of the weak interaction and the influence of more exotic particles, such as mesons. This matched perfectly with the development of Roger's interests and so began a lifelong friendship and collaboration.

Wilkinson had published several papers on the observation of parity-violating effects in a variety of nuclear reactions and electromagnetic processes, and this led Roger to study the nature of the parity-nonconserving internucleon potentials. A two-part paper (13) on this topic became a standard reference and much later, in 1990, was declared a 'Citation Classic'. In fact, these papers were written while Roger was spending the academic year 1959/60 as a Visiting Associate Professor at MIT, a visit that was encouraged by Weisskopf, who had earlier interacted with Roger in Oxford. Important collaborations developed during this year with Herman Feshbach on parity violation (see (14)), and with Henry Stroke on hyperfine structure (15). Roger and his family took full advantage of their year in the USA by travelling, which included a two-month stay at the La Jolla campus of the University of California.

A considerable number of research students worked with Roger during this period, many of whom went on to make names for themselves. They included I. P. Grant (FRS 1992) (Oxford), J. N. L. Gauvin, R. D. Amado (Pittsburgh), C. A. Caine (Oxford), G. Barton (Sussex), S. P. Rosen (Purdue), V. Gupta, D. S. Onley, L. M. Delves (Liverpool), J. Le Tourneux, R. M. Spector, P. G. Thurnauer, R. J. Philpott, L. Novakovic, S. Papageorgiou and R. C. Barrett (Surrey).

Roger was a fluent writer and, among all his other activities, he found time to undertake substantial revisions of the classic textbook *Atomic physics* by Max Born FRS, to bring it up to date. Born had first published the book in 1935. Revisions were published in 1957, 1962 and 1969 (with J. M. Radcliffe). A philosophical side to Roger's thinking was apparent when he was invited to give one of a series of lectures in Oxford on the theme 'Turning points in physics', which were later published (12). His title was 'The end of mechanistic philosophy and the rise of field physics'.

The move to Sussex

During his year at MIT, Roger took an active part in the teaching programme and was impressed by its difference from the Oxford system. He was already critical of the way in which things were done at Oxford and the very slow rate of change. In particular, he was unhappy with the lack of coordination between different lecture courses and between the lectures and the tutorials. He even gave a public lecture in Oxford in 1960 called 'The approach to physics teaching in England and America'. In 1961 the first of a new wave of universities, the University of Sussex, opened its doors, limiting admissions in its first year to the arts and social studies areas, with science to follow a year later. Its prime mover and first Vice-Chancellor was John (later Lord) Fulton, an ex-Balliol Fellow and previously the Principal of University College, Swansea. In the spring of 1961 he was looking for a small number of scientists to lead the opening of science at Sussex in the autumn of 1962. It was always the plan that research activity at Sussex should have equal weight with teaching from the beginning and that there should be innovation in the teaching methods. It seems that Roger's name came up through the Oxford grapevine and he was invited for a private talk with Fulton. There was a meeting of minds. Roger applied for one of the advertised posts; he was formally interviewed and swiftly appointed as Professor of Theoretical Physics.

The organization at Sussex, with only arts and social studies in its first year, 1961, had crystallized around the idea of Schools of Studies rather than Departments. This sought to break down the conventional barriers between subject departments and implied, for example, teaching the literature of a country in the context of its history and philosophical thought. This idea was to be followed also for the sciences and so, in the first year of science at Sussex, 1962, only one school, the School of Physical Sciences, was created and Roger was appointed as its dean. The school contained three subject groups: mathematics, physics and chemistry. The unity of the school was exemplified by some compulsory courses, for all first-year students, in mathematics and in the structure and properties of matter, which Roger taught. There were also, at first, some common colloquia at the postgraduate level. Tutorials were given in groups of five students rather than the Oxford one-to-one. Looking back over nearly 50 years one can see, in the sciences, a gradual drift back to the departmental system, largely driven by the need to maintain the professionalism of each subject in comparison with those in other universities. In fact, as early as 1965, the chemists broke away to form the School of Molecular Sciences, which was much more like a standard department of chemistry, leaving behind the School of Mathematical and Physical Sciences. Subsequent expansion brought in biology, engineering and medicine but care was always taken to establish links between subjects to maintain some of the original philosophy.

Research at Sussex

In spite of the administrative demands in setting up the new school at Sussex, appointing staff and devising syllabuses, Roger kept up the momentum of his research with about 30 papers between 1962 and 1975. His research students during this time included M. M. Tint, S. C. K. Nair, C. Yalcin, C. T. Yap, P. Herczeg, S. Peachey, A. M. Khan, A. B. Coutinho and A. Barroso. In broad terms, he continued the search to see what could be learnt about interactions between elementary particles from carefully chosen properties of nuclei; in his words (26), to

'use the nucleus as a laboratory'. This approach was complementary to the direct investigations of particle physics through very-high-energy collisions. The relevant features in nuclei are often small, and great care has to be taken to distinguish them from well-known effects. For example, in looking for evidence of a charge dependence in the nuclear interaction (17) one must first eliminate effects of the well-known electromagnetic Coulomb force. Violation of parity was well established in the weak interaction, but Roger (19) related a possible parity-violating term in the strong interaction to the circular polarization of a γ transition in ^{181}Ta. A test for the violation of time-reversal symmetry was proposed (23) through a measurement of the β-decay of ^{134}Cs, and the role of 'second-class currents' in the weak interaction was investigated (20). Roger's most notable piece of work during this period came about through a collaboration with Joan (Dr J. M.) Freeman, an experimentalist of Australian origin who worked in the Tandem Accelerator Group at AERE, Harwell. Among her interests were precision measurements of those β-decay transitions that could give crucial information on theories of the weak interaction. By chance she had also been on leave at MIT while Roger was there and, once again, he became involved in a fruitful collaboration with an experimental group. They wrote a joint paper (22) in 1970 on the radiative corrections to the β-decay lifetimes of the 'superallowed' transitions between states with zero angular momentum. It concluded that the data could be understood only if the weak interaction contained a very heavy intermediate vector boson with mass greater than about 20 times that of the nucleon. The existence of such particles, now called the W and Z, was established much later by more direct methods, and their masses, about 80–90 times that of the nucleon, were found to be consistent with the prediction. In 1976 Joan Freeman and Roger were jointly awarded the Rutherford Medal and Prize of the Institute of Physics for this work. In the same year, Roger was elected to the Fellowship of the Royal Society for his overall contributions to nuclear physics.

Roger was in demand for writing reviews in his rapidly moving and difficult subject. He did not disappoint (see (9, 18, 21, 25), to list just a few), and he published a 340-page book (24), *Fundamental interactions and the nucleus*, in 1973, which concentrated on a detailed description of the weak interaction.

Administration at Sussex

As Dean of the School of Mathematical and Physical Sciences, Roger clearly had administrative duties, but in 1970 he took on the wider responsibilities for the university as a whole when he accepted the newly formed post of Deputy Vice-Chancellor for two years. The post had been created by Lord (Asa) Briggs, who had succeeded John Fulton as Vice-Chancellor when the latter retired in 1967. Asa Briggs had been with the university from the beginning as Dean of the School of Social Studies and was seeking to reduce the load on the Vice-Chancellor to enable him to continue with academic work. This was not a happy period for Roger, partly because he was in charge when student protest was at its peak and the Vice-Chancellor was away on leave. At the end of two years the university accepted his proposal that the position of Deputy Vice-Chancellor be abolished, with much of the administrative work passing to the Secretary and Registrar, within the administration. Undaunted by this experience, Roger nevertheless accepted the more restricted post of Pro-Vice-Chancellor (Science) in 1977. It was concerned with the coordination in teaching and the distribution of funds between the different science schools. Perhaps his acceptance was also influenced by the recent appointment of Sir

Denys Wilkinson, his old friend and colleague from Oxford, as Vice-Chancellor, to succeed Asa Briggs. Before taking up this position Roger was given sabbatical leave for six months, which he spent travelling to many universities and institutes across the USA, Europe and the Middle East.

School education

Roger's move to Sussex had been largely driven by the opportunity to remodel the teaching of science at the university level. It came as no surprise therefore that, soon after his election to the Fellowship of the Royal Society, he became a member of the Royal Society Education Committee in 1977 and Chairman of the Joint Committee on Physics Education of the Royal Society and the Institute of Physics from 1978 to 1983. These committees were concerned with science education down to age 5.

On an even broader scale in 1983 Roger was appointed by Sir Keith Joseph, the Secretary of State for Education and Science, to chair the newly created School Curriculum Development Committee (SCDC). He was seconded from the University of Sussex for two days per week. This committee, together with the Secondary Examination Council (SEC), replaced the old Schools Council. Roger chaired the SCDC for its entire life until, in 1988, it was replaced by the National Curriculum Council. Such is politics but, overall, this was a fulfilling period for Roger. He had an excellent relationship with the Chief Executive of the SCDC, Keith McWilliams, and enjoyed trying to accommodate the views of different parties, schools, local education authorities, politicians and professional teaching organizations. Towards the end of his chairmanship, in the summer of 1987, Roger agreed also, but perhaps with some hesitation, to chair a more detailed task group set up by the Secretary of State for Education and Science, Kenneth Baker, to formulate proposals for a detailed curriculum in mathematics. This venture ended unhappily. An interim report was expected within a few months but there were tensions within the group between traditional methods and more modern ideas. The interim report was not well received by Mr Baker, and Roger resigned from the group at the end of 1987, although he continued to chair the SCDC.

Like many other universities at the time, Sussex was encouraging older members of faculty to retire early so as to release funds for the appointment of young people. Roger responded by retiring in 1987 but continued to teach part-time for a few years. His commitment to educational work continued through membership of various committees (see the list given below), until he reached the age of 70 years in 1994.

Roger's philosophy on education is set out in 27 publications listed in the separate 'Education' section of his full bibliography, but the key word is 'flexibility'. Although he had benefited from attendance at a good grammar school, he opposed selection. He also opposed any sharp distinction between 'academic' and 'vocational' courses in the post-16 years. He felt strongly that all 14–16-year-olds should spend at least 20% of their school time on science. Even in higher education he favoured flexibility in the form of easier transfer between courses and 'honourable exit' from degree courses, with some kind of certificate for what had been achieved.

The Institute of Physics

In addition to this work on education in the schools, Roger served on various professional bodies (see the list below). But the most important, and the most rewarding for Roger, was his presidency of the Institute of Physics from 1990 to 1992. By chance, the Institute had also appointed a new Chief Executive, Alun Jones, in 1990 and there was an immediate rapport between them. In fact, they had met many years earlier when Jones had begun working as a nuclear physicist in the Clarendon Laboratory at Oxford before moving out of physics for some years. Together, they launched the Campaign for Physics (28), which resulted in a 30% increase in membership of the Institute by 1994. According to Jones, Roger was a model president. He always sought advice before making speeches and demanded a brief from officials before chairing meetings. He was energetic in dealings with outside bodies but not afraid to criticize even Ministers when necessary. The public profile of UK physics was definitely raised during his presidency.

Science and the people

Although spending much of his time at the forefront of nuclear research and in seeking to improve the quality of education at both secondary and higher levels, Roger was always aware of the need to communicate with the man in the street about science. As early as 1958 he gave one of a series of six public lectures in Oxford under the general title of 'Turning points in physics' (12) and, in the early 1960s, he was involved in some work for radio, albeit for the Third Programme. This included 'Parity' (16) as one of six talks in the series 'A few ideas', and 'The weak field' as one of nine talks on 'The scientist's toolkit'. He also appeared as one of four panellists on the Home Service (Radio 4) programme 'Who knows?', a question and answer session in which listeners' questions about science and technology, sent in by post, were answered. Much later, in 1997 and well after his retirement, Roger wrote *Eureka*, a short 100-page book aimed at, among others, 'any lay person who wishes to know about physics and is prepared to countenance the occasional algebraic symbol'.

In 1993, after his presidency of the Institute of Physics, Roger was appointed President of the Association for Science Education, a body concerned more generally with science teaching at all ages, including the very young. Roger's house in Lewes was only a few steps away from one of the town's largest primary schools. To get some experience of teaching science at the primary level, and encouraged by his wife, Audrey, Roger approached the head mistress for permission to sit in on some classes. He was welcomed in and was soon teaching (unpaid) small groups of 10-year-olds for two or three hours a week. He found the interaction immensely rewarding, especially the enthusiasm and frankness of the children compared with the behaviour of a typical undergraduate in a tutorial. One example that gave Roger particular pleasure was when one of the girls 'worked out Newton's third law for herself'. With this activity Roger had come full circle, back to his own enthusiasm for electrical gadgets as a boy.

Music

Occasionally, and perhaps at times of stress, Roger would walk a few yards from the physics building at Sussex to spend an hour playing the organ in the Meeting House. Making music had been a major element in his life. While a teenager he had been deputy organist at his local church and at school he played the organ for speech day at the De Montfort Hall in Leicester. Even in the army he was accompanist to an amateur concert party and organist at the local church at Mhow in India. In his second year at Oxford he served as college organist and choirmaster at Wadham with occasional appearances at the Town Hall and St Aldate's Church. During this time he continued to take organ lessons, first from Harold Spicer, the organist at Manchester College and then, monthly, from Sir John Dykes Bower, the organist at St Paul's Cathedral. He became an Associate of the Royal College of Music in 1949. At Sussex he had no regular commitment in music but played publicly, from time to time, as a piano accompanist with singers and instrumentalists and as a stand-in organist at most churches in Lewes, including the prison chapel.

Awards

1976 Rutherford Medal of the Institute of Physics (with J. M. Freeman)
1977 Silver Jubilee Medal
1987 Hon. Fellow, Wadham College, Oxford
1990 Hon. DSc, University of Sussex

Committees

1966–70 Member, Royal Greenwich Observatory Committee
1967–70 Member, Nuclear Physics Board of the Science Research Council
1971–75 Member, Physical Sciences Sub-Committee of the University Grants Committee
1977–82 Editor, *Reports on Progress in Physics*
1977–94 Member, Royal Society Education Committee (chairman, 1992–94)
1977–83 Chairman, Royal Society Physics Education Joint Committee
1980–84 Member, Royal Society Hooke Committee
1982–84 Member, Nuclear Physics Board of the SERC
1982–83 Member, Council of the Royal Society
1983–86 Member, Academic Standards Group of the Committee of Vice-Chancellors and Principals, Reynolds Committee
1983–87 Chairman, School Curriculum Development Committee
1990–92 President, Institute of Physics
1993–94 President, Association for Science Education

Acknowledgements

First and foremost I am grateful to Roger's wife, Audrey, for supplying me with his collection of books, papers, notes and press cuttings dating from his school days through to his last teaching activity in the local primary school. Alun Jones provided a moving account of their time together when in charge of the Institute of Physics, and my colleague David Bailin advised on Roger's contributions to particle physics.

The frontispiece photograph was taken in about 1977 by Godfrey Argent and is reproduced with permission.

Reference to other authors

Lee, T. D. & Yang, C. N. 1956 Question of parity conservation in weak interactions. *Phys. Rev.* **104**, 254–258.

Bibliography

The following publications are those referred to directly in the text. A full bibliography is available as electronic supplementary material at http://dx.doi.org/10.1098/rsbm.2007.0041 or via http://journals.royalsociety.org.

(1) 1951 Polarised nuclear reactions. *Proc. Phys. Soc.* **64**, 700–711.
(2) 1952 (With J. A. Spiers) Beta decay theory I. Selection rules and energy spectra. *Proc. Phys. Soc.* **65**, 801–808.
(3) (With J. A. Spiers) Beta decay theory II. Angular distributions. *Proc. Phys. Soc.* **65**, 809–814.
(4) 1953 The magnetic moments of spin 1/2 nuclei. *Proc. Phys. Soc.* **66**, 1158–1162.
(5) (With M. A. Grace & H. Halban) Oriented nuclear systems. *Prog. Nucl. Phys.* **3**, 63–83.
(6) 1954 (With M. A. Perks) The deviation of nuclear magnetic moments from the Schmidt lines. *Proc. Phys. Soc.* **67**, 885–894.
(7) 1955 (With M. A. Grace & H. Halban) Experiments with oriented nuclei. In *Beta and gamma ray spectroscopy* (ed. K. Siegbahn), pp. 600–612. Amsterdam: North-Holland.
(8) 1956 Theories of nuclear moments. *Rev. Mod. Phys.* **28**, 75–101.
(9) 1957 (With M. A. Grace) Oriented nuclei. *Handb. Phys.* **48**, 555–610.
(10) *Theories of nuclear moments.* Oxford University Press.
(11) 1958 (With J. S. Bell) Mesonic effects in beta decay. *Nucl. Phys.* **6**, 87–99.
(12) 1959 The end of mechanistic philosophy and the rise of field physics. In *Turning points in physics* (ed. J. de Boer, H. Brinkman & H. B. G. Casimir), pp. 5–29. Amsterdam: North-Holland.
(13) 1960 Parity non-conserving internucleon potentials. *Phys. Rev.* **118**, 1605–1606.
(14) 1961 (With H. Feschbach) Effects of parity non-conserving internucleon potentials on the photoeffect in H^2 and H^3. *Nucl. Phys.* **27**, 395–404.
(15) (With H. H. Stroke & V. Jaccarino) Configurational mixing and the effects of distributed nuclear magnetisation on hyperfine structure in odd-*A* nuclei. *Phys. Rev.* **123**, 1326–1348.
(16) 1964 Parity. In *A few ideas. Talks from the BBC Third Programme on six scientific concepts*, pp. 15–21. London: BBC Publications.
(17) 1965 (With C. Yalcin) Charge dependence of the internucleon potential. *Phys. Lett.* **15**, 258–260.
(18) 1966 (With S. C. K. Nair) The fundamentals of beta decay theory. *Adv. Phys.* **15**, 493–545.
(19) 1967 (With E. Maqueda) Parity impurities due to a static PNC potential. *Nucl. Phys.* **91**, 460–464.
(20) 1968 (With P. Herczeg) Second class currents and the weak nucleon–nucleon interaction. *Nucl. Phys.* B **5**, 291–307.
(21) 1969 Isospin in nuclear beta decay. In *Isospin in nuclear physics* (ed. D. H. Wilkinson), pp. 115–172. Amsterdam: North-Holland.

(22) 1970 (With J. M. Freeman) Coupling constant and electromagnetic radiative corrections in beta decay and the mass of the intermediate vector boson. *Nucl. Phys.* A **150**, 369–378.
(23) 1973 (With F. A. Bezerra Coutinho) A theoretical study of *T*-violation in ^{192}Pt. *Nucl. Phys.* A **211**, 157–164.
(24) *Fundamental interactions and the nucleus*. Amsterdam: North-Holland/New York: American Elsevier.
(25) 1979 Mesons in nuclei—an introduction. In *Mesons in nuclei* (ed. M. Rho and D. H. Wilkinson), pp. 5–61. Amsterdam: North-Holland.
(26) The nucleus as a laboratory. *Cont. Phys.* **20**, 377–399.
(27) 1990 Michael Anthony Grace. *Biogr. Mems Fell. R. Soc.* **35**, 129–149.
(28) 1992 Towards physical fitness. *Sci. Public Affairs* (Autumn), 49–51.