Gordon Leslie Squires
2 July 1924–10 April 2010
Fellow of Trinity 1956–2010

A tribute from Sir John Bradfield (1942) at the commemorative gathering, 20th November 2010

It is a great sadness but also a great honour to pay tribute to Gordon Squires' three major contributions to Trinity, where he was a Fellow for 54 years (1956–2010). He came from St John's in the fertilising flow of inter-College exchanges. When Gordon was appointed a University Lecturer in 1956, Trinity wisely swooped on him and never regretted it. We were shrewdly advised by John Ashmead, then retiring as our Physics Teaching Fellow. He had admired Gordon's excellent teaching and research abilities.

So Gordon joined the eminent band of Trinity's Johnians. They include John Redman, last Warden of the King's Hall and then first Master of Trinity when Henry VIII merged the King's Hall and Michaelhouse to create our College in 1546. They include also Richard Bentley who was a great classical scholar, but autocratic and avaricious—at war with the Fellows for some 40 years.

Gordon's character was quite different: modest, cooperative and unselfish. But interestingly he shared one outstanding aim with Bentley. Both wanted Trinity to continue pre-eminent in the sciences. Bentley for example built an observatory on top of the Great Gate for Cotes, the brilliant Newton follower who died young and of whom Newton said 'if he had lived we might have known something'. Bentley also created a chemical laboratory for the Italian pharmacist, Vigani, using the huge fireplace in what we now call Vigani's Room, behind the Clock Tower in Great Court. I vividly recall my first supervisions in front of a blazing log fire in that same fireplace.

Gordon on the other hand built nothing physical in Trinity. But he made great improvements in arranging science supervision and optimising its content - improvements which won the praise of as distinguished a judge as Michael Berridge, then a Teaching Fellow in Biology. On the first Tuesday of Michaelmas Full Term Gordon, as unofficial senior Director of Studies in Natural Sciences, gave a lucid summary of the complex Natural Sciences Tripos to the assembled Science Freshers, summoned them to meet with all the Supervisors on the following Friday in the Old Kitchen, encouraged visits to our superb Library and, finally, invited them warmly to a party after the Matriculation Dinner.

Before the Squires reform of arrangements each supervisor would sit in his College room and students would arrive in dribs and drabs all afternoon to try to fix up supervision times. Inevitably, given the size of the College, time-clashes developed and the whole merry-go-round had to start again. The plenary session in the Old Kitchen, arranged by Gordon, got the whole job done in an hour.

He then went on to the vital optimisation of content by writing a splendid guide for new Supervisors, suggesting how to get best results. Here are two choice extracts:

> If you cannot answer a student's question, a perfectly acceptable answer is 'I don't know, but I'll try to get the answer for next week. In the meantime think about it yourselves.' Far from being discreditable this is good supervising. In the first place students are quite pleased to be able to trip the supervisor up occasionally. It is also a good thing to show a naïve student that supervisors, like everone else in physics, do not know it all. Lastly, if you do come back with the answer it will probably make more of an impact and they will probably remember the point better than if you had produced an immediate answer. . .
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> One final point. The general purpose of supervision is to cover a lecture course. However, a supervisor should try to go beyond this and attempt to convey the interest and excitement of the subject. The most successful supervisor in science was John Henslow who aroused Charles Darwin's interest in natural history. The probablility that one of our students will become a Darwin or an Einstein may be low, but even at a less exalted level the arousing of a student's enthusiasm is the most valuable outcome of supervision.

The whole document is full of wisdom. Moreover, he himself supervised our physicists superbly for 50 years, extending well after his formal retirement, winning praise throughout and never suffering a complaint.

Remember that we were founded for the promotion of education, religion, learning and research—in that order. So Gordon's improvements went straight to the heart of our primary purpose, education. That was his first major contribution to Trinity.

Incidentally, and closely related to that first major contribution, Gordon helped admirably with the important matter of maintaining good relations with schools. His wife Shoshana, to whom he was so devoted (Shosh to her friends), showed me a beautifully written, carefully preserved 1976 letter from a Liverpool comprehensive school which ran thus:

> We recently came across one of your past scholarship questions. 'An Astronaut floats in space at some distance from his orbiting capsule. He is initially at rest relative to the capsule and is disconnected from it. Can he (a) turn himself around, (b) propel himself in a straight line, by moving his limbs suitably?' Seeing as our masters were undecided about the solution, we wondered if you could send us the correct solution.
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> Yours sincerely, Lower Sixth Physics Class.

Gordon replied in a two page letter, clearly and briefly giving one line answers: 'Yes' to turning round; 'No' to propelling in a straight line, and then giving a full statement of the reasoning with diagrams and maths, concluding with best wishes for their future physics discussions. Splendid. We all ought to do something like that periodically—but sadly there is no longer a scholarship exam!

Gordon's second major contribution to Trinity was 12 years' service (1995–2007) as

Secretary of the Honorary Fellows Committee. So he helped tremendously at both ends of our academic spectrum, on the one hand improving for science students the organisation and content of the small class teaching which is our essence, and on the other hand organising selection of mature members of the College at the apex of their achievements who provide further jewels in our academic crown. This second function required of course extreme delicacy and good sense. Gordon poured oil on any troubled waters. Results were a tribute to his skill in such matters.

Gordon's third contribution was to Trinity's knowledge of itself. It consists of two superb chapters on Trinity Physicists which he wrote for the coffee-table book, Trinity, a portrait, now in preparation. He completed them only just before his sad and unexpected death. They are lucid, learned, succinct and eloquent. His eyes sparkled when he told me about them. And I was stunned by the start of the chapter on Newton and Maxwell. It runs as follows:

> By common consent the four greatest physicists in history are Archimedes, Newton, Maxwell and Einstein—and two of these were at Trinity. No doubt Archimedes would have come here had Henry VIII lived before him, but Einstein was a late developer and would not have been admitted with the present admission standards.

If that does not make the coffee-table scholar read on, nothing will.

Gordon admirably summarises Newton's life and work in maths and science. He skilfully covers Newton's administrative ability as Master of the Mint, reissuing the coinage, and as President of the Royal Society for nearly 24 years - together with Newton's profound interest in theology and alchemy. He ends on Newton's personal qualities. In summary, Newton resented criticism, was very sensitive about priority, quarrelled with Hooke, Leibnitz and others, but was kind to his young followers - like Cotes of the Great Gate observatory mentioned earlier. And quoting Gordon: 'He was greatly attached to his mother and tended her as she lay dying. His relations with other women were minimal. He dropped his acquaintance with Vigani, the first professor of Chemistry in Cambridge, when the latter told him a loose story about a nun' - a last sentence of interest at Trinity where Vigani lectured but was not a Fellow.

Gordon then deals brilliantly with the first five Cavendish Professors: Maxwell, not fully appreciated in life but now thought worthy of inclusion in the first chapter with Newton; and a second chapter on Rayleigh, J J Thomson, Rutherford and Bragg, all Trinity and all Nobels except Maxwell, who died before the prize was created. Time forbids detail of Gordon's elegant summaries of these physics giants, save for brief comment on Rayleigh. In Vigani's Room, aforementioned, we have a charming small picture of Rayleigh in his own lab at his stately home, Terling Place in mid-Essex. After five years as Cavendish Professor he returned to Terling to work in his own lab. His Trinity friends included Arthur Balfour, later Earl Balfour, Prime Minister and Chancellor of Cambridge University, of whom we have a fine portrait on the Wren Library staircase. Balfour's home was in Scotland so, while Prime Minister, he often stayed at Terling. When there he would help with Rayleigh's experiments. Gordon pithily remarks that few scientists have had a Prime Minister as lab assistant! And what a Prime Minister - distinguished philosopher, much interested in science and above all, for our purposes, responsible while Foreign Secretary for the celebrated 1917 Balfour Declaration in favour of a

Jewish national home, particularly dear to Gordon and his family. So much for Gordon's third major contribution to Trinity.

Like so many Fellows, up to the retiring age he combined Trinity work with heavy University work, in Gordon's case excellent physics practicals leading to his McGraw-Hill Practical Physics book, plus outstanding Part II lectures on Quantum Mechanics leading to his Cambridge University Press book entitled Problems in Quantum Mechanics: With Solutions - a must for all one would think! He was also a Visiting Professor at MIT and at the University of Jerusalem. After retirement he devotedly managed and further developed the fascinating Cavendish Museum.

In addition to all this Gordon was of course very active in neutron research in the Cavendish as we shall hear later, leading to his book entitled Introduction to the Theory of Thermal Neutron Scattering. And it was a particular pleasure to Gordon's friends here that in 1996 an International Symposium to celebrate his work on neutron scattering was held at Trinity, and that many of his former research students attended, including several from such notable U.S. labs as the Argonne, Chalk River and Los Alamos. Gordon was much moved and pleased by the high-quality presentations in fields related to the one he had started. Neutron News 1996, Volume 7, has a charming reference to the gathering.

When I myself became a Junior Research Fellow here at twenty-two, I thought that research was the be-all and end-all of life, and for some it rightly is. But I later realised that absolutely first-class teaching not only provides both vital stimulus and foundation for future researchers, but can also provide a good base and cultural background for the far greater numbers heading for the non-academic world. That's why Gordon was so precious: he really put his heart into both teaching and research.

Finally, however, despite the importance of his three major formal contributions to Trinity - and his Cavendish work - it's in a much more informal context that I think of him most often and most affectionately. If a sociologist studied our Fellows, which heaven forbid, he might well be intrigued by the timing of their lunches, where they fall roughly, and of course with some overlap, into three groups. There is the early brigade arriving soon after opening time of 12.15. Then the middle brigade, much the largest, arriving at times quite variable from day to day between say 12.30 and 1.20. Lastly the late brigade, arriving after 1.20, sometimes shamefacedly after the closing hour of 1.30, and almost certainly containing myself and until recently Gordon.

That is where I really got to know him. We often sat on till past 2 pm deep in conversation - and kindly tolerated by our excellent staff, to whom Gordon was always most courteous. He would give me much valued supervisions on the more complex aspects of physics, elegantly simplified to suit a mere biologist like myself. I in return would try to answer his many questions about finance and investment. It was a most happy symbiosis, a splendid example of the wealth of mutual education available at High Table. But we also spoke often about world political problems, particularly of course the Middle East, where Gordon would retail to me his fairly moderate Jewish views, but tell me also the rather firmer views of his wife. He was certainly no push-over for Palestinians, but he could see both sides of the many difficult questions involved. I often thought that if only the moderate Gordon and a reasonable Palestinian could be given plenary powers to achieve a binding compromise, they could fix it up in a few weeks. But the real world is not like that and, sadly, Gordon is no longer here.

His death has deprived us of a cooperative, courteous, kind, tolerant and unselfish Fellow who was exceedingly modest about his multitudinous achievements. He could be jolly and had a good sense of humour. He had striven nobly for the welfare of Trinity and of Physics. The late lunch brigade has suffered a great loss. So has the College as a whole. And I personally miss him very much, very much indeed. Amen.

Gordon Leslie Squires by some of his former research students.

By kind permission of the editor, Neutron News, in which this obituary appeared in Volume 21, 3 (2010).

Gordon Leslie Squires, one of the pioneers of neutron scattering in the postwar period, passed away peacefully on Saturday 10th April 2010 in Cambridge, England. While Gordon is known to all neutron scatterers as the author of *Introduction to the Theory of Thermal Neutron Scattering*, not so many are aware of his role in the 1940s and 1950s. When he was hired into the Cavendish Laboratory, Neville Mott referred to our field as "a funny mix of nuclear and solid-state physics". The Squires group from Cambridge then established itself at Harwell, long before any formal user program, sharing a time-of-flight beam line with Peter Egelstaff's group, originally on the world's first liquid hydrogen cold source at the BEPO reactor and later on the cold source at the DIDO reactor.

An undergraduate in Cambridge during the Second World War, Gordon then worked at the Royal Aircraft Establishment, followed by PhD research back in Cambridge immediately afterwards with J M Cassels (Rutherford's last PhD student) using a cyclotron-driven neutron source, before moving to Harwell and doing experiments on the first British Reactor BEPO. He spent two years in the USA, at the University of Chicago and Princeton University, before moving back to Trinity College Cambridge and the Cavendish Laboratory in 1956, where he remained ever since. He was a wonderful teacher and mentor, with a deep love of experimental physics. For instance he believed strongly in Rutherford's tradition that every graduate student should 'build their own piece of scientific apparatus', something that is increasingly difficult in these days of large-scale facilities.

Gordon made a number of original scientific contributions, including measurements of the ortho- and para-hydrogen cross-sections (with A T Stewart in 1953), the first observation of critical scattering with neutrons (1954), and a series of studies of the lattice dynamics of elements together with his students. But it is perhaps how Gordon built on his pioneering research days to become an outstanding research supervisor and gifted university teacher in the years that followed that will equally contribute to his enduring legacy. Alongside his textbook *Introduction to the Theory of Thermal Neutron Scattering*, which emerged from his lecturing and teaching to quickly become, and remain, a canonical text in the field for the last thirty years, Gordon nurtured a long line of graduate students who have remained deeply involved in the development, progression and widening of the neutron scattering technique across the world.

As a university lecturer and director of studies for many years at Trinity College he also oversaw the education of many generations of undergraduates in physics, writing a highly successful book, *Practical Physics*, for use with senior undergraduate laboratory

courses. A particular passion of his was the teaching of quantum mechanics through tutorials and lectures that quickly became renowned as models of clarity and elegance in university teaching. His undergraduate text *Problems in Quantum Mechanics (with Solutions)* and an article on quantum mechanics for the *Encyclopaedia Britannica* also ensured that a wider audience was able to enjoy his skill in conveying the physics behind this fascinating subject.

In recent years, Gordon had been the curator of the small museum within the Cavendish Laboratory, looking after and displaying its unique collection of artefacts from the history of physics, including the equipment used by James Chadwick to demonstrate the existence of the neutron itself. Gordon's enthusiasm for this subject led him to write several articles and become a regular guest speaker on the historical characters and experiments they performed, at numerous neutron summer schools and meetings. Typically modest, he was often surprised at the large audiences his talks attracted but never failed to delight them with his deep knowledge and insights into some of the defining experiments in physics.

Gordon is survived by his wife Shoshana, and two sons, Adam and Dan.

Andrew Boothroyd, Oxford University, UK.
Malcolm Collins, McMaster University, Canada.
Christopher Frost, Rutherford Appleton Laboratory, UK.
John Horton, University of Nottingham, UK.
Spencer Howells, Rutherford Appleton Laboratory, UK.
Andrew Huxley, Edinburgh University, UK.
Toby Perring, Rutherford Appleton Laboratory, UK.
David Price, CNRS-Orleans, France.
Roger Pynn, University of Indiana, USA.
Rob Robinson, Bragg Institute, Australia.
Sunil Sinha, Unversity of California San Diego, USA.