Sir Michael Atiyah celebrated his eightieth birthday on 22 April 2009

SIR MICHAEL ATIYAH

When I retired as Master twelve years ago I thought, with some relief, that I had given my last speech, but the College has kindly invited me for an encore. Compressing eighty years into my allotted time of thirty minutes is a challenging task, so I will skate over the periods which are most familiar to you, and I will begin with a brief sketch of my family background.

As you will realize, the Atiyahs did not come over with the Norman Conquest, and my father's family was Lebanese. Like many Lebanese they emigrated, and my grandfather went out to Khartoum in the wake of Kitchener, as one of the first western-trained doctors in the Sudan. My father grew up there and, after going to Oxford, he worked in the Sudan civil service, essentially as a liaison officer between the British colonial government and the Sudanese community.

Surprisingly, I am not the only Fellow of Trinity with Khartoum connections. Patrick Collinson has just reminded me that he spent some years there as a University Lecturer at the same time as my brother Patrick (whom I will mention again later).

I myself spent my early years in Khartoum and then went to Cairo for my secondary education, just before the battle of El Alamein. This background of the Sahara desert explains why, in 1945, when I went to Manchester Grammar School, there was a fine blackboard illustration of three camels to greet me. Since I had never ridden on a camel it was not till much later that I realised this picture was to welcome the exotic new boy.

But to return to my parentage. My mother was not Lebanese but Scottish, though brought up in Yorkshire. Her father trained for the Church at St Andrews and Glasgow Universities, wrote poetry and, perhaps for that reason, failed to find a post in Scotland. He had to move south to become not quite the vicar of Wakefield but vicar of the small village of Alverthorpe nearby. My mother, whose middle name was Cochrane, claimed to be related to the Earls of Dundonald Cochrane, the most notable of whom was an Admiral who won battles by disobeying orders, and became famous in Latin America as the man who defeated both the Spanish and the Portuguese navies. I would like to claim him as a relative but, as he was a six-foot red-haired giant, the evidence is not very convincing.

This maternal ancestry of mine is a minor reason why we now live in Edinburgh, but the Scottish roots of my wife help provide a much deeper reason. In addition, both Edinburgh and Beirut share the magnificent landscape of sea and mountains which Cambridge, for all its other attractions, lacks.

By an odd quirk of history both by my grandfathers were in Scotland in the 1880s and, since they both moved in theological circles, they may actually have met. The explanation goes back to my paternal great-grandfather Yussef Atiyah. He had been converted to Presbyterianism by American missionaries, not as you might imagine from Islam (this was not allowed by the Ottoman rulers), but from the Greek Orthodox Church. He then trained for the ministry and became a noted theological writer. One of his works (in Arabic) attracted the attention of Sir William Muir, the famous orientalist, Professor and subsequently Principal of Edinburgh University. As a result Yussef's son Salim (my grandfather), then a medical student at the American University of Beirut, was sent to Edinburgh to deliver the manuscript to Sir William Muir, who translated and published the book. When I settled in Edinburgh I went to

the Muir Institute, met the Arabic scholars there, and found someone who knew all about this book by my great-grandfather, and so the circle closed.

After this little family digression, let me pick up the story in 1947. After getting my Trinity Scholarship I opted to do my National Service. At that age I was somewhat idealistic and felt I should do my bit by becoming a Bevin boy and going down the pits. But Bevin boys were no longer required by then and the army was the only choice, so I left school early, around my eighteenth birthday, and awaited my call-up papers. Months passed and nothing happened. Eventually I wrote to the War Office and got a reply explaining that, although I had been born in England, my father was not a British Citizen, so I would have to wait until I was 21, at which stage I could choose between becoming British and taking my father's nationality. In fact my father was technically stateless, since the Sudanese passport on which he travelled did not, for arcane political reasons, confer Sudanese nationality. I had known this all along but it took months of further correspondence to persuade the War Office that the choice between UK nationality and no nationality was no choice at all. Finally they saw the light and I was summoned to appear at Carlisle barracks within forty-eight hours or face dire consequences.

My military career was undistinguished, but there was one high point when I was drilling a squad on the parade ground. The regimental sergeant-major, a crusty old warrior whose voice was hoarse from over-use turned to me and said, 'I wish I had a voice like yours'. My loud voice, which I inherited from my father, was a frequent cause of embarrassment to my wife whenever we dined in a genteel restaurant, though it has been an asset for my lectures as well as the parade ground, and it may help tonight.

My national service completed, I came up to Trinity in 1949. Actually my thoughtful Tutor, John Morrison, had persuaded the authorities to let me out a few months early so that I could attend the Long Vac term. As you may know, while engineers and experimental scientists have (or at least had) lab work in the summer, mathematicians have no such requirements. But I was delighted to have an early start to the academic year, enjoying the backs, playing tennis, and browsing in the library. It eased my entry back into the scholarly world.

As some of you know, Morrison left Trinity to become Senior Tutor of Churchill College when it was founded. I am glad to say that my younger brother Joe, who is dining here tonight with his wife Beverley, was in the first undergraduate intake at Churchill and came under Morrison's wing.

The first mathematical Fellow of Trinity I met was my supervisor, Abram Samoilovic Besicovitch, known to all as 'Bessie'. With his great shock of white hair and his pronounced Russian accent, he was an intimidating figure, especially when seen from the bottom of the narrow stair that led up to his study over the New Court gate. But he was friendlier than he appeared, and I subsequently had the courage to interview him for *Eureka*, the undergraduate mathematical journal. His life-story was fascinating, particularly the episode when, in post-revolutionary Russia, he was smuggled across the Baltic in a small boat to go and study in Copenhagen with Harald Bohr (noted mathematician, brother of Niels Bohr and a Danish national footballer). The Rockefeller Foundation had given Bessie a scholarship that covered all his expenses, including smugglers' fees.

Trinity had a bumper crop of mathematicians in my year, many of whom went on to have distinguished careers within and beyond mathematics. I am delighted that one of my closest friends, John Polkinghorne, is here tonight. As you know, he exchanged quantum theory for higher mysteries. Another of my contemporaries and friends was James Mackay, who moved with success into the law, rising to the exalted rank of Lord Chancellor.

Some forty years later, when I returned as Master, Richard Glauert unearthed an old photograph from the *Cambridge Evening News* of 1951, showing the magisterial procession through Great Court for the installation of Lord Adrian. The dominating figure was of course the Head Porter but, on the grass verges, wearing academic dress, were the ranks of undergraduates. Conspicuous in the first row were the youthful trio of John Polkinghorne, James Mackay, and myself. I now have this framed at home to remind me of those early years.

James was one of the steady flow of Edinburgh graduates who came to Cambridge as a sort of finishing school. The roll call, at Trinity alone, is impressive: James Clerk Maxwell, Ian Cassels, James Mackay, Keith Moffatt, Jim Mirrlees. But even more important for me was a young lady who went to Girton (Trinity not yet being co-ed). I refer of course to my wife Lily who has returned with me tonight. I should perhaps add that in those student days I was the underling, being only Secretary of the Archimedeans when Lily was President.

It is customary on such occasions to admit to some youthful indiscretion, such as climbing over the rooftops or removing Henry VIII's chairleg. I have no head for heights so I cannot regale you with any such tales. However I did once organise a petition to the College Council asking that book prizes might be obtained from bookshops other than the traditional one of Deighton Bell. I suspect this got me put on the list of potential trouble-makers.

In 1955, with my Title A Fellowship behind me, Lily and I were married and promptly went off to Princeton to one of the few institutions that can rival Trinity College. The Institute for Advanced Study, whose first professor was Albert Einstein, was a magnet that attracted talent from all over the world. In my various stays there I formed friendships that blossomed into life-long collaborations with mathematicians from Germany, France, America, and elsewhere, and widened my intellectual horizons. There is actually a long and close link between Trinity and the Princeton Institute. Freeman Dyson, John Elliott, and I were professors there while you, Master, and your predecessor Amartya Sen were Trustees, and the current Director is Peter Goddard, former Master of St.John's but originally a Trinity Title A Fellow.

In retrospect I am amazed and horrified at the amount of travel and upheaval I inflicted on my wife and family. Young men are in a hurry and, after three years as a Tutorial Fellow at Pembroke (Cambridge), I followed in the footsteps of G.H. Hardy and moved to Oxford, becoming in due course his successor as Savilian Professor of Geometry and Fellow of New College. As a cricketing fanatic, Hardy had even persuaded the Fellows of New College to play an annual match against the boys of New College choir school. Although the boys were not over thirteen, they could be demon fast bowlers, so it was with great trepidation that I performed my duty as Savilian Professor and went on to the field, usually accompanied by Freddy Ayer. I declined however to captain the team, as Hardy had done, and left that thankless task to more capable hands. I should explain that my cricketing experience at Trinity had been restricted to the annual match of the Trinity Mathematical Society against the Adams Society of St John's, at which the first ball, in honour of Newton, was always bowled with an apple.

My going to Oxford, where I eventually spent nearly thirty years, was a return to a family tradition. My maternal uncle had been a Classics Fellow at Merton, and it was through him that my parents had met. My brother Patrick also went to Oxford and eventually became Professor of Law there. While we were both students I once came over from Cambridge to visit Patrick, traveling on my dangerous motorbike with James Mackay on the pillion. Years later, James, as Lord Chancellor, officiated when Patrick was sworn in as a Q.C.

My alternate movements between Oxford and Cambridge were always well-timed, so that I would arrive just as my new university began a winning streak in the boat-race. I clearly remember that the only boat-race I actually attended as a spectator was a dramatic

disappointment, not because my boat lost, but because the opposition (Oxford) sank, long before the boats reached our viewing point.

Professors at Oxford in those days gave a few lectures, but had no undergraduates to teach. Instead our responsibility was to do research, organise seminars, and train research students. During my long time in Oxford I had around fifty D.Phil. students, who came from as far afield as America, Australia, and even Cambridge. After a few short years many became colleagues, collaborators, and friends. I have been fortunate to have had some really brilliant students, including half a dozen who are now Fellows of the Royal Society. It is a chastening thought that the older ones are now on the verge of retirement.

My time at Oxford was not entirely devoted to mathematics. I arrived in the wake of the Franks report, the outcome of a mammoth two-year enquiry into the College and University structure of Oxford. But the one thing Franks did not propose to change was the decision mechanism in which the crucial vote depended on the handful of academics who were prepared to come to the Sheldonian on Tuesday afternoons. Having just come from Cambridge, where a more flexible system operated, I proposed a procedure for postal votes, which gathered so much support that the authorities caved in and adopted it. Once this was operational, it resulted in long-overdue reforms getting passed, notably the abolition of Latin as a compulsory entrance requirement and the removal of barriers to the admission of women to men's colleges.

In 1990, as you know, I returned to Trinity as Master. A few things had changed in my thirty-year exile, but Great Court was still the same, and I had wisely exchanged my garret on K staircase for the grander room diagonally opposite. In preparation I read all the books I could find on the history of the College and the University, from Trevelyan's little book to the larger tomes of Monk and Winstanley. When installed in the Lodge I discovered, in the small collection passed down from previous Masters, a small pamphlet that described itself as 'the true and impartial account of the case of Dr Richard Bentley'. Impartiality and Bentley do not really go together.

Having steeped myself in College history, I realised why there is no statue of Bentley in the Ante-Chapel, to join the illustrious group presided over by Isaac Newton. As if to emphasise that the omission is deliberate, there is actually a gap in the rows – a space waiting to be filled. It had always been my dream to insert James Clerk Maxwell into that gap, but I never had the temerity to propose it to the College Council. The most I succeeded in doing in this direction was having Maxwell's portrait moved from the Parlour into the Hall, but even that took time and only happened five years after my retirement. A College of this antiquity does not act in haste.

The Master chairs the College Council and has other ex officio duties, but he may also sit as an individual on some committees. In my case I chose (or was chosen for) the Wine Committee and the Garden Committee. The first was informative and the second instructive. I cannot now afford the wine that my palette was introduced to, nor do I have an army of gardeners for my modest Scottish estate, but returning here today gives me the welcome chance to enjoy both the cellars and the gardens of the College.

As you know, Master, it seems to be a tradition of the twentieth century that still persists at the beginning of the twenty-first century that a Master of Trinity, if a scientist, should also be President of the Royal Society. This is the reason why their two Councils meet on different days of the week, but it can be tricky to get to Trinity on Friday morning after a late Thursday night at Carlton House Terrace, especially during a blizzard. It was more convenient during World War II, when the Royal Society was evacuated from London and set itself up here in Trinity. Some Presidents/Masters have their sentences concurrent and some have theirs

consecutive. In supermarket terms the distinction is between ‘Two for the price of one’ and ‘Buy one, get one free’. Both are bargains, but I belong to the first category.

In 1997, when I retired and had to vacate the Lodge, we had to choose where to live: return to Oxford, buy a house in Cambridge, or move elsewhere. For the reasons I have earlier alluded to, we chose to move to Edinburgh where Lily was brought up – she always reminds me that she did not leave Scotland before the age of 21.

We arrived in Scotland just in time to cast our vote for Scottish devolution, and I now realise that when *The Scotsman* refers to the Capital it means Edinburgh, and when the weather forecasters talk about the south of the country it is the Borders that they have in mind. Having been seduced by the charms of Scotland, I became enough of a Scot to be elected, a few years ago, President of the Royal Society of Edinburgh, a younger sister of the one based in London, but covering both Arts and Science. The Society emerged during the remarkable period, in the eighteenth century, of the Scottish Enlightment, and its past luminaries include David Hume, Adam Smith, Walter Scott, Lord Kelvin, and Clerk Maxwell. I had thought I should turn out tonight in a kilt, but Lily exercised her veto.

During my three years as President I undertook the task of commissioning and erecting a statue of Maxwell in the heart of the Edinburgh New Town, where Maxwell first lived. This is a consolation for my failure to have one in the Ante-Chapel. That may take a little longer.

I came up to Trinity on a mathematical scholarship just sixty years ago, and I still describe myself as a mathematician. But over the past thirty years I have drifted into theoretical physics – some of my mathematical colleagues think I keep bad company, where reasoning is sloppy and the purity of mathematics is sullied. I suspect that would have been the view of G.H. Hardy, though I hope Newton would have been more tolerant. In fact I feel I am very fortunate to have lived and worked in such an exciting period, when mathematics and physics have rediscovered their fundamental links.

I always remember the talk I once had, many years ago, with Henry Whitehead, nephew of the Trinity philosopher A.N. Whitehead who collaborated with Bertrand Russell. Henry was Professor of Mathematics at Oxford and a leading topologist. He was also a genial companion who liked his pint of beer at the pub after a game of cricket. He told me that he had so many friends, all over the world, in his field of topology that it would be terrible if one day he had a brilliant idea in a different field, say functional analysis. He would be duty bound to pursue his idea (he had a deeply serious side) and so lose his old friends. I was fortunate to be spared this fate. I did not change fields and move into physics – instead physics moved in my direction. As a result, my circle of friends has widened to include both mathematicians and physicists. There is an interesting story about this merger between the two fields.

Some time in the mid-seventies we mathematicians belatedly discovered that we were working on problems which were also at the forefront of theoretical physics. When I was visiting MIT, where much of this work was going on, on both sides of the fence, I asked the physicists why they had not gone to talk to their mathematical colleagues just down the corridor. Their answer was that the connecting door was kept permanently locked. When I expressed surprise they explained that they had a new carpet and did not want the mathematicians walking over it with their muddy shoes! The opening of closed doors is important for the progress of science.

Beyond the strictly scientific world I have also been involved with several other organisations, but the one I would like to single out is the Pugwash movement, or to give it is full title ‘The Pugwash Conferences on Science and World Affairs’. This is an international organisation that was founded in the aftermath of World War II to control the threat of nuclear

weapons. It was launched in a manifesto issued by Bertrand Russell and Albert Einstein and signed by many famous physicists, including some who had worked at Los Alamos on the development of the atomic bomb, as well as their German counterparts. Over the years Pugwash brought top scientists from Russia and the West together and helped to broker the various treaties that were eventually signed, limiting the testing and numbers of nuclear weapons. For this, Pugwash and its moving spirit Joseph Rotblat received the Nobel Peace Prize. I took over the presidency of Pugwash when Rotblat retired in 1997 at a time when, after the collapse of communism in Eastern Europe, it seemed that a new world order was about to emerge. Sadly the United States took a wrong turning and the opportunity was lost. I am glad to say that, under President Obama, sanity has returned to the international scene and we may again hope to see a world free from the threat of nuclear annihilation.

Master, I am grateful to the College for inviting me back tonight. When I first came to Trinity, straight from the army, I was overwhelmed by its sheer beauty, the architectural and intellectual splendour, the freedom it gave and the opportunities it opened up. I was in paradise. But the outside world beckoned and, like the itinerant scholars of medieval Europe, I have flowed with the intellectual tide.

I am often asked ‘Where do you come from?’ – a question I find difficult to answer. What should I say: Khartoum, Beirut, Cambridge, Oxford, Princeton, Edinburgh? I just say I am a citizen of the world, but a Trinity man.