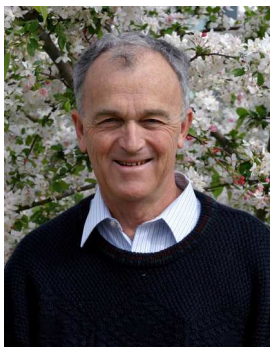
Emeritus Professor Garth Ian Gaudry

16 May 1941 – 18 October 2012



Emeritus Professor Garth Gaudry died in Sydney on 18 October 2012 after a long battle with a brain tumour. Those of us in the mathematical community will remember him for different reasons; as research collaborators, as a friend, a teacher, lover of red wine, rugby, music and many other things. Above all he will be remembered for leadership in promoting mathematical sciences in the community and politically.

Personal connections

Garth was my friend and colleague who came into my life at the end of the 1980s. An early encounter involved a meeting in a Carlton coffee café with Garth, David Widdup and me. David was Executive Director of the Federation of Australian Scientific and Technological Societies (FASTS) and a wonderful friend of mathematics. Garth was the inaugural President of the Australian Mathematical Sciences Council (AMSC) and I had just become secretary. Garth and David were discussing a press release with what I can only describe as happy enthusiasm. As the language of the press release became more and more colourful, I thought this is going to be an interesting time. So it proved to be.

Early history

Garth's family history dates from the First Fleet. It is a fascinating story of which he was rightly proud and so I have reproduced part of a speech his wife Patricia gave at a dinner for his 70th birthday as an appendix.

He was the son of a Queensland primary teacher and spent his first nine years in Rockhampton. His father then became head teacher at Tekowai outside of Mackay and Garth completed his secondary education at Mackay High School, riding his

bike five miles each way. After topping the state in Year 10 and winning the Brynes Medal, he almost repeated the feat in Year 12, coming second and gaining an Open Scholarship to the University of Queensland.

A first class honours in mathematics, several prizes for mathematics, and the prize for the highest undergraduate record in the Faculty of Science, were followed by a PhD at the Australian National University supervised by the late Robert Edwards. Garth and his mathematics contemporaries in Canberra were among the first Australian students to complete their PhDs in Australia.

While Garth was at the University of Queensland, his father became Head Teacher at Wellington Point State School near Brisbane. The retiring Head Teacher was John Coe, whose daughter Patricia Coe was also attending the University of Queensland studying mathematics. The two teachers met, and subsequently their children met. Garth and Patricia were married in Brisbane in January 1965.

The PhD at ANU was followed by a CSIRO scholarship for postdoctoral studies in Paris in 1966–1967 and a Reserve Bank scholarship at Warwick University in England. The years 1968–1970 were spent at Yale University in Connecticut USA, as a Gibbs Instructor, a prestigious appointment for beginning academics.

Garth returned to ANU in 1971 where he again worked with Robert Edwards, his former PhD supervisor. Together they wrote *Littlewood–Paley and Multiplier Theory*, an influential monograph on harmonic analysis. While at ANU Michael Cowling became his first PhD student.

Academic leadership

The years 1972 to 1993 were spent in Adelaide. At the newly established Flinders University, he became a Professor of Mathematics at the age of 32 and subsequently ran the Flinders Mathematics department for many years. He was instrumental in the creation and development of the Computer Science discipline and established the in-house computing facilities of the disciplines of Mathematics and Statistics. He set up and taught the first courses using MAPLE.

One of the highlights of Garth's time at Flinders University was a very special student by the name of Terry Tao who came to him at the age of 12. With Garth's guidance Terry was able to enter Princeton University at the age of 17 where he graduated with a PhD at age 20. He was a full Professor at the age of 24.

Terry has won many prizes and awards and in 2006 was awarded the Fields medal. Seeing Terry presented with the Fields Medal at the International Congress in Madrid was undoubtedly a highlight of Garth's life. In 2005 he wrote: 'I consider it one of the highlights of my life, both professional and personal, having had the privilege to help guide and form one of the most famous young mathematicians of our age.'

In 1993 Garth moved to the University of New South Wales where he soon became Head of School. Under his leadership, the School built up strong links with the Faculty of Commerce and Economics (now the Australian School of Business),

Garth Gaudry (right) and Fields Medalist, Terry Tao.

and introduced a number of successful initiatives, including several joint degrees: undergraduate programs in Actuarial Studies and in Mathematics and Finance, and a new Masters degree in Quantitative Finance. He strengthened and expanded the Department of Statistics by filling a second Chair and providing several new posts to support it. Research excellence was promoted through judicious funding and encouragement, including trebling the budget for conference and research travel.

Research

Garth's main area of research was harmonic analysis, with particular emphasis on singular integrals, Fourier multipliers, and analysis on Lie groups. There are close connections with several parts of classical partial differential equations and potential theory, and links with applications, notably in engineering.

After completing his PhD with Robert Edwards, Garth spent several years in the USA and Italy, where his main collaborator was Alessandro Figà-Talamanca. Garth and Figà-Talamanca solved an important outstanding problem of Hörmander on the non-approximability of Fourier multipliers which tend to zero by compactly supported multipliers. This led to a body of papers on restriction and extension of Fourier multipliers and on Littlewood-Paley theory, and on Garth's return to Australia, to his monograph with Robert Edwards on Littlewood-Paley and multiplier theory, which was based on the novel functional analytic approach that he had been pioneering.

His work with Anthony Dooley on contractions of Lie groups and applications to transference of singular integrals from one Lie group to other Lie groups obtained by contractions marked a significant advance in the role of contractions in analysis, and stimulated further work on this topic by Dooley and others.

Garth made significant advances in the study of singular integrals on solvable Lie groups in a series of collaborations, with Peter Sjögren and others. With Tao Qian, they gave the first examples of homogenous operators, akin to Riesz transforms, which are not bounded on the L^p spaces; this is in stark contrast to the more familiar positive boundedness results in the Euclidean and nilpotent settings, and is still considered a fundamental example by the large number of mathematicians working on analysis on manifolds. These results were extended to the case of solvable groups in general rank one semisimple groups.

Extensive work with Brian Jefferies and Werner Ricker was the first to give a systematic analysis of convolution operators on Hilbert-space valued functions. This involves kernels which take values in an infinite-dimensional space of operators. They proved a number of very surprising results about critical behaviour on vector-valued L^p spaces.

Garth was a regular invitee to important international conferences and a member of the Editorial Board of the international journal *Expositiones Mathematicae*.

Professional leadership

Garth's involvement with raising the public profile of mathematics began while he was at Flinders. He was Vice-President of the AustMS in 1986–1988 and President during 1988–1990. His presidency coincided with an unprecedented period of policy formulation and change, triggered by a number of government inquiries and initiatives. Submissions were presented on research policy, mathematics teacher education, and on higher education. The crucial importance of mathematics and mathematics education was promoted at both State and Federal government levels.

The Federation of Australian Scientific and Technological Societies (FASTS), now Science Technology Australia, had been formed in late 1985. In 1988 Garth took a leading role in the creation of the Australian Mathematical Sciences Council (AMSC) in order to provide a powerful combined voice for the relevant professional societies within FASTS. Garth became the inaugural Chair and as Board Member of FASTS from 1989 to 1992 he developed valuable links with scientists from other disciplines.

The effectiveness of the AMSC was greatly enhanced by Garth's commitment to it and by the support it received from the FASTS Executive Director, Dr David Widdup. David's assistance with liaison with governments, and with access to press and radio, led to Garth's on-going media coverage on matters concerned with mathematics and mathematics education that was to span some 20 years.

In November 1991 AMSC organised a National Symposium on Mathematics at the Academy of Science to promote to the community at large the importance of the mathematical sciences to the life of the nation. Garth organised prominent speakers who addressed topics such as AIDS research and quality control in the automotive industry. There was extensive press coverage. These types of events have since been a feature of the mathematical sciences, including ones organised to promote discipline reviews in 1996 and 2006.

Garth appreciated the excellent teachers who saw him gain the scholarship to the University of Queensland and the opportunities he had for further study within Australia. He became one of a group of Australia's mathematicians who have viewed with dismay the decline of mathematics education in many rural and less well resourced schools. They see young people denied the opportunities to pursue careers in mathematical disciplines that they had. It underpinned Garth's involvement in policy and political issues concerning mathematics education.

His time as President of AMSC, and the early years of his time at UNSW, coincided with major battles around school curriculum. In Victoria new subjects in the VCE proved disastrous. The Statements and Profiles, an attempt at a national curriculum in mathematics using what was known as 'outcomes based education' approach, were also being introduced. These developments occurred with minimal involvement from the mathematicians and statisticians or even teachers. The mathematicians went to war. Garth led the outrage and was vocal in his criticism, gaining significant press coverage including a front page story in the Sydney Morning Herald in 1994.

In 1995 Garth was a member of the Eltis Committee established by the NSW government to examine the Statements and Profiles approach to education. The committee recommended abandoning the approach and all its recommendations were accepted by the Government. Garth very much enjoyed his time on this committee and especially meeting teachers from across NSW.

Sanity returned to the VCE subjects in Victoria although it is still possible to find students of those days who resent to this day 'being experimented on'. The Profiles lived on in various forms but were never fully implemented.

The biggest win has probably come more recently with the development of the current national curriculum. From the very start of this development the Australian Curriculum, Assessment and Reporting Authority has treated the mathematical scientists with a respect that was never part of the developments in 1990s. There is little doubt that this is an outcome of the very public criticism of the previous attempt at a national curriculum in which Garth was a key figure.

Above all Garth will be remembered for his contribution to the establishment of the Australian Mathematical Sciences Institute (AMSI). In 2002 I sent a message to all Heads of mathematics and statistics departments in the universities that there was an opportunity to obtain funding through a Victorian government initiative to establish a mathematical sciences institute at the University of Melbourne. Garth immediately saw the benefit to the broader mathematical community and committed the UNSW to full membership. Others followed, the funding proposal was successful, and AMSI came into being. Garth became the AMSI inaugural Director in 2003 and was instrumental in solidifying what has become a major asset to the mathematical community.

Dr Brendan Nelson was Minister for Education and Science at the time and appointed Dr Thomas Barlow as his science advisor. Garth and I had a breakfast meeting with Thomas that led to a meeting with the Minister who took a keen interest in AMSI. He found funding within his department's budget for the first two

Summer Schools. Honours students from around the country were able to attend four weeks of stimulating courses and peer interaction, the first at the University of Melbourne. The 11th AMSI Summer School was held in 2013.

The 2003 Federal budget included $7.8M for an International Centre of Excellence for Education in Mathematics (ICE-EM). Garth ensured that AMSI submitted a comprehensive and innovative proposal that was successful and ICE-EM came into being within AMSI in 2004. Garth was appointed Director of ICE-EM concurrent with the post of AMSI Director. In July 2004 he relinquished the AMSI Directorship to become full-time ICE-EM Director.

ICE-EM funded many higher education activities including the establishment of the network of Access Grid Rooms, further Summer Schools, the Graduate School at the University of Queensland and BioInfo Summer. All of these initiatives continue under AMSI's collaborative framework and make a major contribution to the nation's mathematical capability.

The grant also led to major initiatives in school education. Garth arranged a number of meetings with mathematics teachers and asked them what would assist them most. It was a seminal moment when one of them said: 'the textbooks we use are awful'. And so the ICE-EM schools mathematics materials consisting of books and support materials came into being. He worked tirelessly to see this project come to fruition until ill health forced his retirement in 2008.

AMSI has become fundamental infrastructure for the mathematical sciences. In June 2012 the Institute celebrated ten years of success and Garth was presented with an AMSI Distinguished Service medal. Unfortunately he was too ill to attend but I travelled to Sydney to deliver it in person.

Life outside mathematics

Garth's enormous contribution, both to research in mathematics and his service to the mathematical community, did not stop him from pursuing many other interests. These included wind surfing and wine. While at Flinders he pursued his love of music, learning and becoming very proficient at the clarinet and subsequently the piano. With his great friend Enrique Gomez-Soto, he organised lunchtime music concerts on the Flinders campus.

He was fluent in both Italian and French. He and Enrique conversed fluently in Italian, despite it not being the native language of either. It was a feature of lunch times at AMSI that Garth's mobile would ring and an animated conversation in Italian would ensue. In later years he became very interested in 4-W driving and outback travel, birds and photography. He took a particular interest in the work of the Australian Wildlife Conservancy.

Awards

In recognition of his mathematical achievements the University of Gothenburg in Sweden awarded him an honorary doctorate in 1994. In addition to the AMSI medal, he was an Honorary Life Member of AustMS.

Garth is survived by his wife Patricia, children Kerry, Rebecca and Peter, and sister Lois.

Appendix

Extract from speech given by Patricia Gaudry in Kable's Restaurant on the occasion of Garth's 70th birthday.

The reason we have chosen this location, dates back 200 years, to the time when Henry Kable built his house here in the Rocks area.

Garth is a 6th generation descendant of Henry Kable, so I thought I would start tonight with some stories of Garth's famous ancestor, Henry Kable.

Henry Kable came to Australia as a convict on the First Fleet. Some say he was the first person from that fleet to set foot on Australian soil as he carried the Governor ashore. Back in England, Henry had assisted his father in stealing some furnishing items and had been sentenced to 14 years gaol. While in gaol, Henry met a fellow prisoner, Suzannah Holmes. They had wanted to marry while in gaol but this was not permitted. Their first child was born in the gaol in Norwich Castle in England. There were many "firsts" in Henry and Suzannah's life together.

When the First Fleet was boarding for its trip to Australia, Henry Kable was put on one ship and Suzannah Holmes on another ship. The Captain of Suzannah's ship refused to board the baby also called Henry, as there were no papers of transportation for the baby. The gaoler, left holding the baby, made a trip from Plymouth to London to plead the baby's case with the Home Secretary Lord Sydney. Lord Sydney agreed that the mother and baby should not be separated and that the baby should also have the trip to Australia.

The story of the adventures of baby Henry made it into a London newspaper. A public subscription raised 20 pounds, which was used to buy books, clothing, and comforts for the family. These items travelled on yet another ship.

When the First Fleet eventually arrived in Australia, Governor Phillip thought life should start lawfully in the new colony so a wedding of four couples was arranged in early February just a few days after arrival. Henry Kable and Suzannah Holmes were married under the gum trees in the first wedding in Australia in February 1788.

When the couple came to claim their gifts, it was found that the clothing and other items were missing. Henry Kable launched the first lawsuit in Australia, against the captain of the ship which had carried his gifts. This successful case earned Henry Kable 15 pounds. This money was the "seed capital" for business ventures in subsequent years.

After the marriage of Henry Kable and Suzannah Holmes, a daughter named Diana Kable was born in November 1788. It is said that she was the first white child born in Australia who lived to maturity. Diana Kable was Garth's great, great, great grandmother.

Henry Kable started his working life in the new colony as nightwatchman of Governor Phillip's cabbage patch. He progressed to chief constable of the gaol. Henry Kable was soon busy with business ventures. In the beginning he acted as middleman, between the officers, and their customers. He progressed to building and outfitting ships in the whaling trade, started coach services to Parramatta, and ran a flourmill in Windsor.

Henry Kable, though without much schooling, had a good head for figures and business. By 1809, he was established as a successful merchant in the new colony. He received many land grants and built a fine three-story home and offices in George Street, Sydney. That building remained until 1920.

Subsequently this hotel was built on the site and descendants of the Kable family were instrumental in having Henry Kable's life remembered here. The Sydney society event of 1809 was Diana Kable's wedding to William Gaudry. It was the first wedding in St Phillip's church in Sydney.

William Gaudry was a well educated free settler who had come to Australia in 1807 bearing a letter of recommendation from no lesser person than the Duke of York, Commander-in-Chief of the British Army, letter addressed to Col. Patterson. William Gaudry working initially with Col. Patterson in van Diemans Land and then start in business in Sydney with Henry Kable.

Unfortunately, William Gaudry died from an acute illness aged only 33. Every Gaudry in Australia is descended from this one man. William Gaudry's grandson Charles moved to central Queensland at the time of gold rush in the 1860s. Charles was a great grandson of Henry Kable and was to become Garth's great grandfather.

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