

Donald Nield



Quite a few years ago someone wrote a short spoof article for the NZMS Newsletter in which there was reference to the famous, but mythical, New Zealand mathematician Fred Daggovich who was said to have been born in Dargaville. I am afraid that I do not have the details. However, it is a great pleasure to write about a real and famous New Zealand mathematician who really was born in Dargaville, or more precisely Mangawhare, on the outskirts of Dargaville just where the main road to Waipoua leaves the river, in 1935.

Don's secondary education in the late 1940s and early 1950s at Dargaville High School culminated in his winning sixth place in the Universities Entrance Scholarship examination, including top in mathematics, and a Junior Scholarship. He moved south to Auckland University College, then part of the University of New Zealand, where he graduated BSc in 1956 and MSc with First Class Honours in Mathematics in 1957. He was Senior Scholar in Physics, Sir George Grey Scholar and Post Graduate Scholar in Science. Fortunately for us he kept with Mathematics but, as we shall see, the depth of his Physics influenced his mathematical career.

Don told me of a memory during the time when he was an honours student at Auckland. That was the time of transition from Professor H G Forder, who was Professor of Mathematics from 1934 to 1956, to Professor F Chong, who was Professor from 1956 to 1965 before moving to Macquarie University in Sydney. At a retirement function for Professor Forder he told a story against himself. His arrival as a fresh Professor in his mid-forties was of interest to the local media who duly sent a photographer to photograph the then retiring Professor H W Segar with the new Professor. At the end of the photo session the photographer then approached the two Professors and asked "Which of you is the retiring Professor?"

In 1957 Don headed off for his first OE, completing Honours in Parts II and III of the Mathematics

Tripos at St Johns College, Cambridge, and graduating BA in 1959, with an MA in 1963. On his return to New Zealand in 1959 Don worked at the Naval Research Laboratory in Auckland, researching acoustic propagation in the sea. Lieutenant Nield left the Navy in 1962 to begin his long association with the University as a staff member. From my perspective the timing was perfect: readily at hand I have in my office a copy of notes from Stage III Pure Mathematics in 1962. In my late teens handwriting they are headed "Calculus Mr Nield" and cover a broad range of multivariable differential and integral calculus and end up with a discussion of Gamma and Beta functions. Thanks for those lectures, Don.

Promoted from Lecturer to Senior Lecturer in 1965, Don completed his PhD in 1967 (the first in Mathematics from the University of Auckland, though Frank Haight had completed a PhD in the study of traffic flows a decade earlier at the then Auckland University College). He was promoted to Associate Professor in 1972. In 1986, as part of its "rationalisation" of the teaching of Mechanics, the University asked Don to transfer to the Department of Theoretical and Applied Mechanics, now the Department of Engineering Science, from which Don officially retired in 1999. Don continued to teach part time until the end of 2006 and he continues as an Honorary Associate Professor in the Department of Engineering Science. Don holds the record for teaching Mathematics at the University, 44 years, a year ahead of his PhD supervisor the late Professor Cecil Segedin.

Later visits overseas have been associated with a range of visiting appointments: Assistant Geophysicist in the Institute of Geophysics and Planetary Physics, University of California, San Diego; Visiting Member of the Institute for Fluid Dynamics and Applied Mathematics, University of Maryland; Visiting Associate Professor in the Department of Aerospace Engineering and Mechanics, University of Minnesota; Visiting Scholar and Professor at Duke University. In December 2005 he gave the G.I. Taylor Memorial Lecture at the Golden Jubilee Congress of the Indian Society of Theoretical and Applied Mechanics.

He has taught a range of courses at all levels in the University specialising, of course, in topics related to applications of mathematics especially to mechanics, fluid dynamics and mathematical physics in general. He has also contributed to his share of University administration: we served together on a departmental committee in the early 1970s and for the last 16 years, even though he has retired, he has been a member of the Engineering Faculty Library Committee. He served on the

executives of the Auckland Mathematical Association and the Auckland University Lecturers Association and was Branch Secretary of the Association of University Teachers. A foundation member of the NZMS he has also been a frequent participant in the Mathematical Colloquia. Professionally he has made significant contributions, such as as a member of the Editorial Boards of the journals *Transport in Porous Media* and *Journal of Porous Media*.

In the community Don has made a number of contributions, including service as Secretary of the Board of Managers of the Somervell Presbyterian Church, the executive of the Auckland Presbyterian Harriers Club and a member of his local School Committee.

Don's research may be broadly described as being in Fluid Dynamics and he has published over 150 research papers on mathematics, physics, geophysics and engineering. His first paper, "Surface tension and buoyancy effects in cellular convection," appeared in the *Journal of Fluid Mechanics* in 1964 and has attracted almost 400 citations. In this paper Don uses a Fourier series method to solve an eigenvalue problem related to convection in a layer of fluid heated from below, when surface tension variations with temperature and buoyancy act together to cause the instability. At least 40 other publications have received at least 10 citations, with two further papers attracting well over 100. Don's h-index² is 21.

One impressive feature of Don's research is that he has not slowed down since retirement. On the contrary, when he retired Don had 83 publications but now the number is up to 155 and there is no let-up. In January this year he submitted three papers, and that was after submitting four in the last three months of 2007.

With a co-author, Adrian Bejan, Don has published a book "Convection in porous media," Springer. The *Mathematical Reviews* review of the second edition begins "This is the second edition of a well-known book on convection in porous media." The reviewer is right to start out this way: the book has received over 1000 citations. The third edition of the book was published in 2006.

Don's writing has not been confined to fluid mechanics and related fields. 25 years ago he wrote a very readable centenary history of Mathematics at the University of Auckland.

Apart from his Mathematics, Don has kept physically active. In the earlier days he did lots of tramping in both the North and South Islands as

well as overseas in Austria and Switzerland. Immediately before the first Australasian Mathematics Convention in Christchurch we planned a tramp at Arthurs Pass but the weather had been so bad that both road and rail links from Christchurch were broken so we wandered around the tip of Banks Peninsula instead. He was also a keen runner. Many are the lunch times when I have run around the streets of Auckland with Don and some other colleagues. A favourite of mine was along the sewer pipe across Hobson Bay, alas now closed to such activities because the authorities are afraid that a runner will break through the pipe into who-knows-what below. Sometimes Don would goad me into longer runs and despite his extra 7 years it was always a challenge to keep up with him yet he never complained if I lagged. I enjoyed those hours of running and talking. It is too bad that the knees eventually cry out "Hold, enough." Unlike me, Don ran a dozen marathons, best time 3.05 at age 46. He also entered the annual run up the steps of the Sky Tower, coming in first for his age group.

Don has maintained his interest in religion, having completed a Bachelor of Divinity degree from the University of Otago. One of his retirement hobbies is writing articles on the interface between religion and science. One article soon to appear discusses Gödel's theorems.

For 47 years (and counting!) Don has been happily married to Rachel (nee Thompson), whom he met at the University Tramping Club. They have three children and six grandchildren.

David Gauld

²<http://en.wikipedia.org/wiki/H-index>