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TWENTYFIVE YEARS OF NEW ZEALAND MATHEMATICS COLLOQUIA*

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The University of New Zealand dissolved into 6 universities in 1962, and the following decade was a period of rapid growth for those universities. Within the University of New Zealand, academics in the colleges in several cities had had very little contact with colleagues in the other colleges, and for several years the mathematicians within the new universities still had very little contact with each other. Indeed, Professor Jim Campbell (Victoria University of Wellington) observed that the only occasion when mathematicians at the New Zealand universities learned of each other's work was when they met each other on leave at Oxbridge!

The British Association for the Advancement of Science had been founded in 1831 as a mobile institution without any permanent base, meeting annually at various cities of the British Empire. Inspired by the continuing success of the BAAS, the British Mathematics Colloquium had been founded in the 20th century as a similarly mobile institution, enabling mathematicians in the U.K. to meet at annual conferences. In 1965 representatives of the Departments of Mathematics in the New Zealand universities did meet in Wellington for a discussion, where Professor Geoff Jowett (University of Otago) proposed the experiment of holding a Mathematics Colloquium in New Zealand. The meeting approved his proposal, and consequently Professor Campbell and Doug Harvie organised the First New Zealand Mathematics Colloquium, which was held at VUW in May 1966. That 1st Colloquium was attended by many of the mathematicians then in New Zealand, several of whom are present at this lecture 25 years later.

The Colloquium archives do not (at present) contain any documents from 1966 or 1967; but I understand that the papers which were contributed at that first Colloquium included "A representation of the sea surface" by Peter Bryant, and "Moments in a graph" by Dr David Robinson. Also, Dr Gillian Brown (now Dr Gillian Thornley†) contributed a paper on "Hypersurfaces in a Finsler space" : a few hours ago she brought us up to date on developments since then within Finsler spaces. At the Business Meeting, Professor John Kalman (University of Auckland) warned of a danger of such conferences, namely; that many mathematicians might travel together on the same aeroplane, so that a single plane-crash could kill most of the mathematicians in the country. There was much discussion about whether any further Colloquia should be held, and if so, whether they should continue to be held in Wellington. Most delegates felt that the first meeting had been successful, and Professor Derek F. Lawden offered to hold the next at the University of Canterbury.

*Invited Address to the 1991 New Zealand Mathematics Colloquium, at the University of Otago, on 1991 May 21.

†President of the New Zealand Mathematical Society, 1989–1991.

Accordingly, Professor Lawden and Dr Peter Bryant organised the 2nd New Zealand Mathematics Colloquium, which was held at the University of Canterbury in May 1967, with 56 people attending [**4**]. The papers contributed then included "Gaussian curvature of a Finsler surface" by Dr Gillian Brown, and "A test of general relativity theory" by Professor Bill Davidson (University of Otago). The organisers received the profit of £23 from the 1966 Colloquium, and they transmitted the accumulated fund of £37-5-6 to the organisers of the next Colloquium. (Later in 1967 in New Zealand, the sterling currency of pounds, shillings, pence and halfpence was replaced by dollars and cents; and the chaotic jumble of Imperial units of weight and measure began to be replaced by the metric ISO system.)

The 3rd Colloquium was held at the University of Auckland* in May 1968, with 75 people attending. For the first time, in addition to the contributed papers there were two Invited Addresses to the Colloquium. Professor Henry G. Forder (1889–1981), who had retired as Professor of Mathematics at the University of Auckland in 1955 (although he continued giving regular courses until 1970), gave an Address on "Fundamentals of relativity theory and textile geometry", and Professor Philippe Tondeur (Auckland, on leave from the Wesleyan University, Connecticut) gave an Address "On the Euler characteristic of flat manifolds". The programme included a Symposium on Education, at which Professor John C. Butcher (Auckland) spoke on a significant innovation: "A first-year computing course". Another of the speakers at that Symposium on Education was Professor Geoff Jowett (Otago), who spoke on "The scope of mathematical statistics at the Upper Sixth level". (During the following few years, the quaint English terminology of "Upper Sixth form" was quietly replaced within New Zealand education by the more rational name of "Seventh Form".) Professor Jim Campbell, on his retirement from VUW, was elected an honorary member of subsequent Colloquia [**24**]. Accommodation for visitors was provided at O'Rorke Hall, at $3 per night for full board. The organisers transmitted the accumulated funds of $98.27.

By 1968, the pattern of attendance at the Colloquia was becoming established. Each Colloquium has been held in May, during the vacation periods for universities in New Zealand and (originally) Australia. Many people working in mathematics welcomed the annual occasion to meet together, with unplanned encounters in corridors and random discussions over coffee often proving to be more stimulating than the formal lectures (but with some of those lectures proving to be very effective). Most of the members of the Mathematics Departments at the New Zealand universities attended the Colloquia, with a few starting to come from Australia. Professors Bernhard and Hanna Neumann (ANU) attended together some of the early Colloquia, and since Hanna's untimely death in 1971 Bernhard Neumann has continued to play a prominent role in many of the New Zealand Mathematics Colloquia. A few people came from other departments of universities, and some came from teacher training colleges and from secondary schools. Some mathematicians have come from the Department of Scientific and Industrial Research and from the Ministry of Agriculture, and occasionally some statisticians have come

*That was the first New Zealand Mathematics Colloquium which I attended, having returned a few days previously from England to join the Department of Mathematics at the University of Auckland.

from other Government departments. Very few businesses in New Zealand have employed mathematicians – but the Amalgamated Brick and Tile Company employed Morrie Mountfort, who was active in many of the early Colloquia. In later years, a few mathematicians have come to New Zealand for the Colloquia from the University of the South Pacific, from Papua-New Guinea, from Singapore, from the U.S.A and from Canada, in addition to those invited speakers who have been brought from around the world by the organisers of Colloquia.

The 4th Colloquium was held at the University of Otago in 1969, with Professor Warren Wong (Auckland, on leave from Notre Dame) delivering an Invited Address on "Recent work on finite simple groups". Most of the Invited Addresses have been published in the *Mathematical Chronicle* and/or *The New Zealand Mathematical Society Newsletter*, starting with this one [**46**]. There were 87 delegates, and the first Colloquium Dinner was arranged, at a charge of $1.25. The 5th Colloquium was held at Massey University in May 1970, with 69 delegates. The invited speakers were Professor Keith Edward Bullen (Sydney) on "The Earth and mathematics" [**6**], and Professor Robert Breusch (University of Waikato, on leave from Amherst College, Massachusetts) on "The prime number theorem and its proofs" [**3**].

There was a welcome innovation at the 6th Colloquium, held at VUW in 1971: at registration, each delegate was presented with a substantial booklet of lecture abstracts, stapled between printed covers. There were 129 delegates, and the programme included a joint symposium with the Operational Research Society of New Zealand and the New Zealand Computer Society. Professor Richard Bellman (University of Southern California) was visiting New Zealand as a Fulbright Fellow, and he delivered an Invited Address on "Mathematical medicine man". The other Invited Addresses were delivered by Professor Harold O. Lancaster (Sydney) on "The development of the notion of statistical dependence" [**30**], by Dr N. Ashcroft (Cornell) on "Mathematical methods in the physics of condensed matter", by Professor John Kalman on "Applications of subdirect products in general algebra" [**29**], by Dr Robert A. Bull (Canterbury) on "Mathematical logic" [**5**], and by Professor Frank A. Haight (Auckland, on leave from the University of Pennsylvania) on "Some mathematical methods for accident analysis". The eminent numerical analyst Professor Louis Melville Milne-Thomson (Otago, on leave from the University of Arizona) contributed a paper. I asked him about his New Zealand connections, and he told me that he had come from England as an infant and had gone to primary school in Hastings, after which he had returned to England.

The 1972 Colloquium, held at the University of Canterbury, was attended by 88 delegates. The Invited Addresses were given by Professor Roy P. Kerr (Canterbury) on "Recent developments in Relativity", by Professor Ivor Francis (Cornell) on "Factor analysis: fact or fabrication?" [**12**], and by Professor John Kalman on "Deductive axiomatization of Boolean and group tautologies". The Business Meeting decided to send 2 copies of the Abstracts to the General Assembly Library. (Now, 3 copies of each booklet get sent to the National Library.) The 1973 Colloquium, at the University of Waikato, was held in conjunction with the Association for Symbolic Logic. Invited Addresses were presented by Dr John N. Crossley (Monash) on "Satisfaction (a brief survey of model theory)" [**10**], by Professor John Butcher on "Computation and theory in ordinary differential equations" [**7**], by

Dr Alan Schumitzky (DSIR, on leave from USC) on "Factorization of operators", by Professor Leslie C. Woods (Oxford) on "Stability of shock waves", and by Professor J.E. Reinmuth (Oregon) on "Quantitative marketing analysis". For the previous few years there had been much discussion about the formation of a mathematical society in New Zealand, with Bernhard Neumann corresponding extensively about the proposal. The 1973 Business Meeting approved in principle the formation of a New Zealand Mathematical Society, and appointed a committee to draft proposals for such a society.

The 1974 Colloquium, at the University of Auckland, was attended by 116 delegates. Invited Addresses were delivered by Professor J.P. Penny (Canterbury) on "Some problems of interactive computer graphics", by Dr Max Agoston (Auckland, on leave from Wesleyan University) on "20 years of differential topology: some highlights" [**1**], and by Professor David Vere-Jones (VUW) on "Statistical methods for geophysical phenomena". A paper on "Dimension theory of orthomodular lattices" was contributed by a 21-year old man who had just graduated as M.Sc. at the University of Auckland – Vaughan Jones*.

DIMENSION THEORY OF ORTHOMODULAR LATTICES

Vaughan Jones
University of Auckland

The orthomodular lattice has been proposed as a model for the underlying logical structure of any empirical science, the most relevant of which is quantum mechanics. The underlying logical structure of quantum mechanics is supposed to be the orthomodular lattice of closed subspaces of a Hilbert Space. There is a canonical dimension function on this lattice.

The projections of a von Neumann algebra also form an orthomodular lattice and von Neumann and Murray constructed dimension functions on these lattices. By isolating the appropriate axioms (modularity, complementation and continuity), von Neumann was able to show that lattices satisfying these axioms (continuous geometries) possess dimension functions.

Attempts are being made to extend the dimension theory to orthomodular lattices. It cannot be done in general, as Greechie has developed a method of constructing a wide class of orthomodular lattices, some of which have no dimension function.

I have shown that a weakening of the requirements of a dimension function leads to the conclusion that every ortholattice possesses such a function.

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*In 1990, Professor Jones (at Berkeley) was elected Fellow of the Royal Society of London, and was awarded a Fields Medal for his revolutionary work on Knot Theory.

The delegates attended a ceremony in the Science Library, where Professor Henry G. Forder attended the formal opening of the Forder Cabinet, which had been designed and built to hold some hundreds of the more valuable books from his munificent gifts to the University Library. (He was then 84 years old, and that proved to be his final visit to the campus.)

The Opening of the Forder Cabinet, May 1974
Prof. John Butcher, Prof. Henry Forder, Prof. Cecil Segedin, Mr Marin Segedin

At the Business Meeting, Professor Gordon Petersen (Canterbury) remarked that each successive Colloquium had been arranged *ad hoc*, and he proposed a regularization of the venues. The Business Meeting approved his proposal of a cyclic ordering of the universities for subsequent Colloquia: Otago, Massey, VUW, Canterbury, Waikato, Auckland – the "Petersen cycle". The Committee which had been appointed in 1973 had produced very bulky documents, and after vigorous discussion the delegates decided to follow the Colloquium Business Meeting by a meeting to found the New Zealand Mathematical Society. Bernhard Neumann immediately paid the first subscription, before the newly-created Society could get around to electing him as Honorary Life Member – which was done subsequently.

The 1975 Colloquium was held at the University of Otago, with 116 delegates (again). Invited Addresses were delivered by Professor Bernhard Neumann (ANU) on "The reflection principle" [**34**] and by Dr Hamish R. Thompson (AMD/DSIR) on "A survey of the work of the Applied Mathematics Division DSIR" [**41**]. Mr W.A. Coppel (ANU) had prepared an Invited Address on "Mathematics from control theory" [**9**]; but he was unwell at the time of the Colloquium, and so Doug Harvie delivered the Address (very effectively) on his behalf. The Business Meeting confirmed the Petersen cycle. Dr Gloria Olive (Otago) commented that the Colloquium had no continuing existence; and to remedy that situation she presented to the organising committee a hand-bell inscribed with the legend **New Zealand Mathematics Colloquium**. That Bell was accepted with much gratitude, as a physical embodiment of the Colloquia. Each subsequent Colloquium has opened

with the ceremonial ringing of the Bell, and has closed with the formal transfer of the custody of the Bell to the organisers of the following Colloquium. The first Annual General Meeting of the NZMS was held in conjunction with the Colloquium. That is a practical arrangement, since the annual Colloquium is the only occasion when many of the mathematicians in New Zealand meet together; and the practice has become a standard feature of subsequent Colloquia.

The 1976 Colloquium was held at Massey University, with 116 delegates (yet again!). Invited Addresses were delivered by Dr Terence Nonweiler (VUW) on "The estimation of areas and integrals for irregular discrete data", by Dr Ian Stewart (Auckland, on leave from Warwick) on "Catastrophe theory" [**37**], and by myself on the first professional woman mathematician "Sof'ya Vasil'yevna Kovalevskaya" [**39**].

The 1977 Colloquium at VUW was attended by 125 delegates, with the Minister of Education, the Honourable L.W. Gandar, delivering an address [**14**] to the Colloquium. Dr Joe Gani (CSIRO) delivered an Invited Address on "Early mathematical models in epidemology and genetics" [**16**], and Dr Jock Hoe (VUW) gave a most impressive account of mediæval Chinese mathematics in his Invited Address on "The Jade Mirror of the Four Unknowns – some reflections" [**23**]. Dr L.W. Szczerba had set out from Warsaw to deliver an Invited Address on "Notions in geometry"; but he suffered the misfortune of getting stranded *en route*, in Bangkok! Many people were impressed by seeing for the first time the film *How To Turn A Sphere Inside-Out*, made by the Open University. That film includes discussions by a panel of mathematicians explaining Stephen Smale's proof that a sphere could be turned inside-out smoothly (i.e. without any cusps or other singularities), and the construction by Bernard Morin (who is blind) of a complicated sequence of geometrical transformations to produce such an eversion. The producers of the film experimented with a variety of styles for representing the complicated transformations, giving an impressive demonstration of the capabilities of computer-generated animated film for conveying mathematical information. At the Business Meeting Dr Gloria Olive complained that the charges made for Colloquium Dinners included the cost of wine. Her arguments (supported by myself) persuaded the delegates to agree that:

N.B. The menu for each subsequent Colloquium Dinner must include Apple Juice as an alternative to wine.

The 1978 Colloquium, at the University of Canterbury, was incorporated within the 1st Australasian Mathematics Convention. That was a most ambitious undertaking, which incorporated also the Annual Meetings of the Mathematical Societies of Australia and of New Zealand, in conjunction with the Annual Conference of the Operational Research Society of New Zealand, and with the support of the New Zealand Mathematical Association. An opening address was again given by the Minister of Education, the Honourable L.W. Gandar [**15**].

The Invited Addresses included: Dr I.D. Berg (Illinois) on "Some developments and problems concerning perturbations of operators on Hilbert spaces", Professor John C. Butcher (Auckland) on "Computational problems associated with stiff differential equations", Dr Yvonne Choquet-Bruhat (Paris) on "Linearization stability of partial differential equations", John C.W. De la Bere (Canterbury)

on "Thomas Harriot – Elizabethan mathematician", B.J. Gardner (Hobart) on "Some current issues in radical theory" [**17**], R. Geel (Gröningen) and E.M. de Jager (Amsterdam) on "Initial value problems for singularly-perturbed nonlinear ordinary differential equations" [**19**], D.A. Griffiths (CSIRO) on "Mathematical epidemics: model or myth?" [**20**], Dr J.M. Hammersley (Oxford) on "First things first", Dr Chris C. Heyde (ANU) "On the Hawkins random sieve: a probabilistic analogue of the sieve of Eratosthenes", Professor D.V. Lindley (London) on "Statistical coherence" and on "Statistics as a mathematical discipline", Dr D. Maharam (Rochester) on "Realizations of automorphisms of category algebras", Alex McNabb (AMD/DSIR) on "Factorizable 'Fruit Cake' boundary value problems" [**32**], Dr P.A. Moran (ANU) on "Asymptotic analysis and central limit theorems", Dr Sidney A. Morris (La Trobe) on "Duality and structure of the locally compact abelian groups ... for the layman" [**33**], Professor Bernhard H. Neumann (ANU) on "The algebra of formal power series", J.R. Ockenden (Oxford) on "Differential equations in industry" [**35**], C.P. Ormell (Reading) on "Mathematics, education and society", Dr J.L. Peck (British Columbia) on "The essence of computer science", Professor A.H. Stone (Rochester) on "Measure-preserving maps and homeomorphisms", Garry J. Tee (Auckland) on "The pioneering woman mathematicians" [**40**], Dr Neil S. Trudinger (ANU) on "Mixed boundary value problems for second order elliptic equations", Dr Alf van der Poorten (UNSW) "On conjectures of Fermat and Abel", Dr T.M. Viswanathan (Rio de Janiero) on "Valuation theory and ordered fields", and Dr S. Yamamuro (ANU) on "Groups of C^∞-diffeomorphisms and differentiation in locally convex spaces" [**49**]. In addition to those invited speakers, 475 people paid to attend the Convention, many of those being teachers who attended the sessions on "Mathematics Education in Schools".

The 1979 Colloquium at the University of Waikato was held in association with the Society for Symbolic Logic (as in 1973), and was attended by 107 delegates. Professor George Andrews (Pennsylvania), was touring the country as the NZMS Lecturer, and the NZMS sponsored his Lecture on "Partitions and the false theta functions of L.J. Rogers". Invited Addresses were given by Professor E.J. Hannan (ANU) on "Time series" [**21**], by Dr R.A. Wooding (DSIR) on "Aspects of flow through porous media", by Professor G.E. Hughes (VUW) on the 14th-century scholastic philosopher "John Buridan on self-reference" [**26**], by Dr Wojciech Wojtýnski (VUW, on leave from the University of Warsaw) on "Standard and nonstandard topics in Lie theory" [**48**], and by the eminent cosmologist Professor William H. McCrea (Sussex) on "Constants of physics: why do we exist in the universe?". William Francis Hawkins was working for a Ph.D. (Auckland, 1982) on the mathematics of John Napier (1550–1617), and he discovered that Napier had published (in 1617) a complete specification for a *Promptuarium Multiplicationis* (i.e. Lightning Calculator). That is a remarkably sophisticated device for multiplication which is almost wholly mechanical, and Napier published the design 6 years before Schickard made his mechanical adder. The Engineering technicians at the University of Auckland built a working Promptuary from Hawkins's translation of Napier's Latin text, and Hawkins gave the first public demonstration of Napier's Promptuary at that 1979 Colloquium. That specimen of Napier's Promptuary has aroused much interest around the world [**21**]. The Colloquium Dinner was enlivened by performances from some entertainers, including a cabaret singer

who gave memorable renditions of some torch songs.

William Francis Hawkins demonstrating John Napier's Promptuary

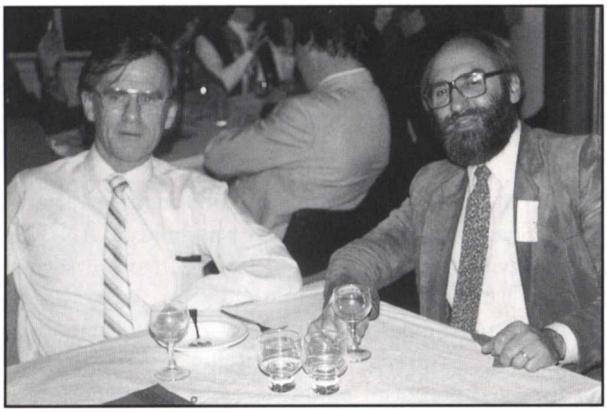
The 1980 Colloquium, at the University of Auckland, was attended by 113 delegates. Dr Rob Goldblatt (VUW) gave the NZMS Lecture on "Categories and creative ideas", and Invited Addresses were delivered by Dr P. Diggle (Newcastle-Upon-Tyne) on "Statistical analysis of spatial point patterns" and by Professor Charles Rees (New Orleans) on "Egyptian fractions" [**36**]. In 1981 the 2nd Australasian Mathematics Convention was held at the University of Sydney, with 370 delegates, including 72 from New Zealand. The principal invited speakers were Professor Seymour Papert on Mindstorms, and Dr Benoit Mandelbrot on Fractals. At least 42 papers were contributed by people from New Zealand, including the NZMS lecture by C.T.C. Wall (Liverpool) on "Stability of singularities in smooth maps" [**44**].

For the 1982 Colloquium at the University of Otago, the number of delegates was once more recorded as 116 (as in 1974, 1975 and 1976)! Dr Paul Erdős (Hungarian Academy of Sciences) included New Zealand in his perpetual peregrinations*, to deliver an Invited Address on "Combinatorial problems in geometry" [**11**]. Invited addresses were delivered by Professor Ivor Francis (Cornell) on "Statistical software" [**13**], by Professor David B. Gauld (Auckland) on "Geometric topology: a sample" [**18**], and by Professor T. Hawkins (Boston) on "Non-Euclidean geometry

*Constructing a space-filling curve?

and Weierstraßian mathematics: the background to Killing's work on Lie algebras". The 1983 Colloquium at Massey University was attended by 87 delegates. Invited Addresses were delivered by Professor David Vere-Jones (VUW) on "Permanents, Determinants, Bosons and Fermions" [**43**], by Professor George Szekeres (UNSW) on "Scales of infinity and Abel's functional equation" [**38**], by Dr Jim Ansell (VUW) on "From seismology to singular value decomposition" [**2**], and by Dr G.A. Watson (Dundee) on "Data fitting when all variables contain errors" [**45**].

The 1984 Colloquium at VUW was attended by 121 delegates. Professor William B. Bonnor (Queen Elizabeth College, London) delivered the NZMS Lecture on "The present state of general relativity". Invited Addresses were delivered by Professor Lee Peng Yee (Singapore) on "Cesàro sequence spaces" [**31**], by Dr J.R. Philip (CSIRO) on "Mathematics, soil and water", by Professor J. Aitchison (Hong Kong) on "Distributions on the simplex", by Dr Michael R. Osborne (ANU) on "Aspects of ℓ_1 estimation", by Dr R.L. Adler (IBM, Yorktown Heights) on "Dynamical systems and information theory", by Dr L.C. Johnston (VUW) on "Is mathematics the 'Latin' for this generation?" [**28**], and by Professor E.J. Hannan (ANU) on "Autoregressive approximation". At the Colloquium Dinner, Professor Wilf Malcolm (VUW) presented Doug Harvie with a cake lit with 30 candles, to celebrate Doug's 30 years in the Department of Mathematics.



Prof. John Butcher and Dr Brent Wilson (1941–1989)

The Business Meeting agreed that the Petersen cycle needed to be re-considered, because of the 2nd Australasian Mathematics Convention. This 1991 Colloquium is not the 26th since 1966: it is the 23rd (or perhaps the 25th). Before the 2nd and 3rd Australasian Mathematics Conventions (in 1981 and 1985) some Colloquium documents spoke of those forthcoming Conventions as incorporating the New Zealand Mathematics Colloquium – but documents following those Conventions refer to them as conferences held instead of Colloquia. The Acquisitions Department of the National Library had requested copies of the booklets of Abstracts for the 13th Colloquium (1978) and the 16th Colloquium (1981). No booklet of Abstracts had been produced for the 1st Australasian Mathematics Convention in 1978, and the booklet for the 2nd Australasian Mathematics Convention (1981) was not regarded

as a Colloquium publication. Accordingly, the Business Meeting decided that subsequent Colloquia would be identified by year, rather than by ordinal numbering.

Instead of a Colloquium in 1985, many mathematicians in New Zealand attended the 3rd Australasian Mathematics Convention. That was held at the University of New South Wales, and it was attended by 288 delegates. The principal speaker was Professor Vaughan Jones, who came from Berkeley to deliver an Invited Address on "Hecke algebras, von Neumann algebras, knots and braids".

The 1986 Colloquium was held at the University of Canterbury. Invited Addresses were delivered by Professor J. McKay (Concordia University) on "The impact of the computer on teaching and research in mathematics", by Professor Richard H.T. Bates (Canterbury) on "Deconvolution revisited", by Professor Warren J. Wong (Auckland, on leave from Notre Dame) on "Maps on spaces of linear transformations" [**47**], by Professor John M. Howie (St. Andrews) on "Why study semigroups?" [**25**], and by Dr J.A. John (Southampton) on "Orthogonality, balance and connectedness in row-column designs". The 1987 Colloquium, at the University of Waikato, was attended by 92 delegates. Dr Peter Hilton (Binghamton, New York) delivered the Mathematical Chronicle Lecture on "Groups with operators", and he also gave an Address on "Teaching and Research: a false dichotomy". Dr Jean Pedersen (Santa Clara) delivered an Invited Address on "The role of geometry in a modern curriculum", and she and Dr Hilton jointly spoke on "The role of discrete mathematics in a modern curriculum". The Colloquium Dinner was enlivened by a band of musicians who performed during the dinner.

The Australian Bicentennial celebrations in 1988 included the Bicentennial National Mathematical Sciences Congress, which was held at ANU in May 1988. Almost all Australian universities had changed by then from 3 terms to 2 semesters, with the consequence that many mathematicians in Australia were not able to attend. However, many mathematicians in New Zealand attended that Congress, instead of a Colloquium. Professor John Butcher delivered the NZMS Lecture, on "Numerical ordinary differential equations and mathematics", and Dr David M. Ryan (Auckland) delivered an Invited Address on "Computational aspects of the solution of set partitioning problems".

The 1989 Colloquium, at Massey University, was attended by 97 delegates, and was followed by a Mathematics Education Day for teachers. Professor Cheryl Praeger (Western Australia) gave the NZMS Lecture, on "Designs and groups". The lecture by Professor Herb Keller (CalTech) on "Global continuation methods and bifurcation theory" was sponsored by Bennett's University Bookcentre. Invited Addresses were delivered by Dr Eve Bofinger (New England) on "Ranking and selection", by Dr Jock Hoe (Massey) on "Mathematics education in China", by Professor Derek Holton (Otago) and Mr David Wallace (who had been a member of the Mathematical Olympiad team) on "New Zealand in IMO territory", and by Professor Saunders Mac Lane (Otago, on leave from Chicago) on "Dynamics of mathematical development".

Dr Kee Teo, Prof. Saunders Mac Lane and Dr Ivan Reilly, at the 1989 Dinner

Professor Graeme C. Wake (Massey) was the chairman of the Colloquium organising committee. He has participated in each of the Colloquia except for 1971 and 1990, and he attended the Australian conferences in 1981 and 1988 (but not in 1985). Can anyone beat* that record?

The 1990 Colloquium, at the University of Auckland, was attended by 95 delegates, with over 200 people attending the subsequent Mathematics Education Day. Dr Gillian Thornley (Massey) delivered the NZMS Lecture, on "Differential geometry – connections!" [**42**], and Dr Marston Conder (Auckland) delivered the Mathematical Chronicle Lecture on "Experimental algebra" [**8**]. The Bank of New Zealand sponsored a lecture by Dr Brailey Sims (Newcastle) on "The existence question for fixed points of non-expansive mappings". Invited Addresses were delivered by Professor Jeffrey J. Hunter (Massey) on "Generalized inverses and their applications to problems in applied probability" [**27**], by Professor Keith Miller (Auckland, on leave from Berkeley) on "Geometrically-based finite-element methods with moving nodes", by Professor Jim Ansell (VUW) on "Mathematical Seismology 1890 and 1990", and by Professor Bill Thompson (Auckland, on leave from University of Missouri – Columbia) on "A belief theory of science".

And now, this 1991 New Zealand Mathematics Colloquium is being held at the University of Otago.

Retrospect

The New Zealand Mathematics Colloquium has continued to exist ephemerally, with the Bell as its only permanent feature. Each successive organising committee has closed its bank account at the end of its operation, and has passed the residual money on to the successor committee, together with the Bell and the accumulated files. Now the older files are to be preserved as archives, kept together with the NZMS archives in the Library of the Royal Society of New Zealand. Looking

*Nobody at the 1991 Colloquium could.

through those files gives one a vivid sense of the changes which have taken place over the 25 years since that first Colloquium in Wellington. The changes from £ to \$, from rods, perches or poles to metres, and from foolscap sheets to *A4* paper, all happened within the first few years of the Colloquia. There is no need to remind you that \$1.25, which paid for a Colloquium Dinner here in 1969, would hardly suffice in 1991.

The committees organising the early Colloquia devoted considerable effort to arranging fare reductions for delegates coming to the Colloquia by train and by inter-island ferries, and also by air; whereas in recent years fare reductions have been sought only from airlines. Indeed, air travel has developed so greatly since 1966 that increasing numbers of mathematicians in New Zealand are now attending conferences other than the New Zealand Mathematics Colloquium during the May vacation. Nowadays, if one has a week free, then it is practicable to attend a conference being held *anywhere* on Earth – *provided* that one has access to travel grants!

Early copies of Colloquium Abstracts were mostly cyclostyled, with some being produced (in colours) on spirit duplicators. Copies of correspondence from the first few years are mainly carbon copies on flimsy paper, with some thermofax copies on heat-sensitive paper (which is very brittle). The early smudgy photocopiers gradually got replaced by clearer copying machines, and the files for the past few years contain many clearly-printed papers produced by laser printers. The hand-written mathematical symbols in the early files were gradually superseded by typewriters with increasingly-versatile mathematical printing; and during the past few years the availability of TEX and other word-processing systems has made it feasible for every mathematician to produce high-quality mathematical printing.

By 1966 the use of computers had completely transformed numerical analysis – but many pure mathematicians then did not recognise numerical analysts as being proper mathematicians. Only limited use of computers had then been made by mathematicians for purposes other than number-crunching. But now, computers have pervaded most aspects of mathematics, as they have done in society generally.

For much of the period since the first Colloquium, the activities of mathematicians had been almost wholly ignored by the news media, and consequently few people in New Zealand had any knowledge of what mathematicians were doing. But that attitude is now changing in New Zealand. In 1990 the Mathematical Olympiad Committee finally received some Government funding, to support its activities in preparing secondary students to participate in the International Mathematical Olympiads. The achievements of some mathematicians are now attracting public attention. In accepting the status of public figures, some mathematicians (including one* present with us today) find it necessary to arrange timetables for being interviewed by journalists, and also for meeting Heads of State – and not just in Japan** but now, remarkably, even*** in New Zealand.

*Professor Vaughan Jones F.R.S. came from Berkeley to Dunedin, to deliver two Invited Addresses to the 1991 Colloquium.

**At the ICM at Kyoto in August 1990, the 4 winners of Fields Medals (since ICM86) and the winner of the Nevanlinna medal had an audience with the Emperor and Empress of Japan.

***On the day following the delivery of this Address, Professor Vaughan Jones flew from Dunedin

Appendix

List of New Zealand Mathematics Colloquia, and of published Abstracts

The 1967 and 1968 Abstracts were published in *The New Zealand Mathematics Magazine* volume **4** (1967) and volume **5** (1968). The journal *Mathematical Chronicle* was published from 1969 to 1990 by the Mathematical Chronicle Committee, at the University of Auckland. Beginning with the 4th New Zealand Mathematics Colloquium (1969), the Abstracts of papers presented at the New Zealand Mathematics Colloquia (plus 3 related conferences in Australia) were published in the *Mathematical Chronicle*, as listed below.

1966, Victoria University of Wellington. (Abstracts not published)

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to Wellington, to meet the Prime Minister (the Right Honourable Jim Bolger), who announced that a New Zealand Science and Technology Medal is to be founded. The Governor General is to award the first such medal to Professor Vaughan Jones.

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