Number 83 December 2001

NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY (INC.)

Contents

ISSN 0110-0025

PUBLISHER'S NOTICE

This newsletter is the official organ of the New Zealand Mathematical Society Inc. This issue was assembled and printed at Massey University. The official address of the Society is:

The New Zealand Mathematical Society,
c/- The Royal Society of New Zealand,
P.O. Box 598, Wellington, New Zealand.

However, correspondence should normally be sent to the Secretary:

Dr Charles Semple, Secretary, NZ Mathematical Society,
Department of Mathematics and Statistics,
University of Canterbury,
Private Bag 4800, Christchurch.

NZMS Council and Officers

Professor Douglas Bridges (University of Canterbury)
Dr Peter Fenton (University of Otago), to 2003
Dr Stephen Joe (University of Waikato), to 2001
Dr Robert McLachlan (Massey University), to 2002
Dr Rua Murray (University of Waikato), to 2003
Dr Charles Semple (University of Canterbury), to 2002
Membership Secretary Dr John Shanks (University or Otago)
Newsletter Editor Dr Robert McLachlan (Massey University)
Legal Adviser Dr Peter Renaud (University of Canterbury)
Archivist Emeritus Professor John Harper (Victoria University)
Visitor Liaison Dr Stephen Joe (University of Waikato)
Publications Convenor Dr David McIntyre (University of Auckland)
Webmaster Dr Stephen Joe (University of Waikato)

Newsletter Correspondents

Sub-Editors

Book reviews Mr David Alcorn (University of Auckland)
Conferences Dr Michael Carter (Massey University)
Mathematical Miniatures Emeritus Professor John Butcher (University of Auckland)

Honorary Correspondents

Geoff Jones Statistics (Massey University)
Michael Doherty Statistics NZ (Wellington)
Lenette Grant Mathematics and Statistics (University of Otago)
David Harte Statistics and Operations Research (Victoria University)
Shaun Hendy Industrial Research Ltd (Lower Hutt)
Stephen Joe Mathematics (University of Waikato)
Mark McGuinness Mathematics (Victoria University)
Judi McWhirter Statistics (University of Waikato)
Donald Nield Engineering Science (University of Auckland)
Aroon Parshotam Landcare (Palmerston North)
Chris Price Mathematics (University of Canterbury)
Mick Roberts AgResearch (Wallaceville)
Mike Meylan Mathematics (Massey University, Albany)
Garry Tee Mathematics (University of Auckland)
Marijcke Vlieg-Hulstman Mathematics (Massey University, Palmerston North)

Web Sites

The homepage of the New Zealand Mathematical Society with URL address:
http://www.math.waikato.ac.nz/NZMS/NZMS.html (Webmaster:
stephenj@math.waikato.ac.nz)
The newsletter is available at: http://IFS.massey.ac.nz/mathnews/NZMSnews.html
Editorial enquiries and items for submission to this journal should be submitted as text or LaTeX files to
r.mclachlan@massey.ac.nz

EDITORIAL

OF BEANS AND THE COUNTING OF BEANS

Fiona and I had a baby recently, a hefty 4kg delivered on August 9, which as everyone warned me, has had a big effect on my life. I seem to remember a Woody Allen short story in which an ageing academic takes up with a young woman who has a serious effect on his research output, reducing it from five monographs a year to a series of commas. My case is of course quite different---it would be a sequence of commas, not a series---but the precedent is there. To set against that there are some clear benefits: Helena has already taught me how to get up early in the morning, something I couldn't do at all until now, and at work, I am thinking of entering her in the Research Outputs Database under Category 17, Other Creative Efforts.

At work it has indeed proved difficult to get my mind going on mathematics again. I tried to break myself in gently, starting with a gripping story of the life and work of Alexander Grothendieck in the October 2001 *Bulletin of the AMS* by Pierre Cartier. AG revolutionized large tracts of mathematics in the 1950s and 60s, including the concepts of *point* and *space* for starters, before suddenly resigning in 1972. He now lives in a hut in the Pyrenees with no

address. The article ends by working its way around to Connes's reintroduction of the Butcher group, discussed in last issue's *Miniature*. It's a romantic story. I know a suitable hut, but I haven't decided yet which branch of maths is ripe to be changed forever.

I'm supposed to be writing a review article on symplectic integration, having naively imagined myself knocking off a draft during my parental leave. Friends, not one word of that article yet exists. At least we have the Science Citation Index on line at work now, which is a great help and a great diversion. Who are all these strangers citing my papers? I am bemused to find that this field, which when I started in 1992 was so small that you could read every paper in it, slowly and carefully, in about an hour, has now ballooned to incredible proportions. There seem to be several hundred relevant papers coming out every year. Think this must be a classic sign of middle age in a mathematician, when you can't keep up with everything in your own field.

The good people at the SCI, bean counters extraordinaire, also put together little reviews from time to time. At http://in-cites.com/research/2001/oct_15_2001-2.html they rank the top 10 maths journals over the past 1, 5, and 20 years by mean citations per article. (Six appear in all three lists, namely *Annals*, *CPAM*, *Acta*, *Inventiones*, the *Bulletin*, and *Advances*.) I find that I haven't published in any of them. Digging deeper, at least I have published in the *most improved maths journal for the second quarter of 2001*, which is something.

The fourth TEAC report is out, at www.teac.govt.nz, and you may have heard that "The commission proposes that a Performance-Based Research Fund be established, using the funds currently allocated as research top-ups to the tuition subsidies ($113m in the 2003 academic year) and a minimum of $20m in new funding. The PBRF would provide an incentive for research excellence, would promote the retention of talented staff and post-graduate students, and would concentrate and focus New Zealand's research effort undertaken in tertiary providers. Establishing the PBRF would weaken the current relationship between most research funding and enrolments, and so would make valuable research much less vulnerable to changes in the pattern and level of learner demand." Presumably, most of our members, believing in their research excellence and its worth, and with at least a flicker of unease about enrolments, would welcome such a development. You will also have your own ideas about the effects of research assessments undertaken in Australia and the UK. (In at least one Australian university, departments receive $2000 in cash for each publication.) In this connection the SCI comes to the rescue once more, as noted in a recent *New Scientist*.

> Butler's study, entitled Monitoring Australia's Scientific Research, found that the average number of times each Australian paper is cited in the scientific literature has fallen dramatically. She links this to a tendency for the extra publications to be in less esteemed journals. In 1988 Australia ranked seventh in the world in terms of relative citation impact---each nation's share of the publish output. On this measure, Australia now ranks eleventh. Butler's report suggests that the change can probably be linked to the introduction by the Australian government in 1992 of a funding system that takes account of publication rates. In other words, the bean-counters just add up the number of papers. Which means there is now a real financial incentive to publish two or three slight papers than one of real substance. Never mind the quality, feel the width. The report is available at www.science.org.au/butler.

Robert McLachlan
Massey University

PRESIDENT'S COLUMN

I am writing this from Oxford, England while on a stint as a Visiting Fellow at All Souls College and a Visiting Professor at the well-known Centre for Industrial and Applied Mathematics. Of course the tragic international events have overshadowed things here.

Being back in Oxford is very much deja vu for me having been a postdoctoral scholar here in 1970-71 with many visits in between. All Souls College which has supported my visit is one of the UK's most elitist institutions, being fully research focused and with no undergraduates. The strength of the Fellowship is still very much the traditional Arts but lately there has been a strong move to embrace the sciences, though I am the first Applied Mathematician they have embraced in the Visiting Fellowships.

At the moment I am scheduled to be in California at the time of the December meetings. The change in our colloquium timings from 1999, when I took up the Presidency---though welcome in terms of the calendar of events, did not make it possible for me to be in Palmerston North in December. The incoming Vice-President (Rod Downey) has kindly agreed to act for me at the December meetings.

The Council has looked recently at the opportunity afforded in the shift in Research Funding in the tertiary sector by the creation of Centres of Research Excellence (CoRE). There is one centred in mathematics, lodged by the NZ Mathematics Research Institute who are to be congratulated in putting this forward. We can only hope that some of the funding is directed towards mathematics in this and other related centres. The outcome will be known in December.

While in the UK, inevitably comparisons between our (low) funding levels and mechanisms and theirs (much better) are to be made. How can we change this continues to be a challenge. Recently NZ government rhetoric has been

positive but the overall level is way too low for us to keep up with other OECD countries. We need also to look inwards to see how our research culture can be nurtured better.

The Forder lectureship is going well. At a meeting with LMS President in Cambridge a few weeks ago the strong support was evident and even the possibility of losing British Council support was of little concern. Tom Korner (Cambridge) has reported positively on his visit in July of this year elsewhere in this issue. I had the pleasure of meeting with Caroline Series (Warwick), Forder Lecturer 2003, when I spoke at a seminar at Warwick in November. She is looking forward to her visit in 2003.

Next year (2002) represents the 25 year anniversary of the inauguration of the NZMS Annual Lectureship. It now alternates with the Forder Lectureship. I spoke here in the UK with the first NZMS Lecturer, Ivor Gratton-Guiness which seemed to reinforce the value of these links.

The annual meetings this year will look at funding issues, and supporting the next Australia/NZ Mathematics Convention in July 2003 (embedded with a lot of mathematical meetings within ICIAM 2003) in Sydney. I hope the Council will agree to set aside some money to support New Zealanders to attend what will be one of the biggest mathematics gatherings in this part of the world. We thank the Massey (PN) colleagues for hosting this year's meetings and know it will be an enjoyable event. We are pleased that the NZMS can support this activity and that the synergy of meetings is becoming clearer. Our Australian colleagues have an observer at these meetings and Hyam Rubenstein will be in that role in December.

We note the recent retirement of the longstanding Secretary of the Australian Mathematical Society (David Elliott) who worked hard to make our two Societies closer. Thank you, David, and we look forward to working with his successor (Elizabeth Billington from Queensland University).

The December meetings bring my term as President to an end. I thank the Council and membership for their work to "further mathematics in New Zealand" and for their support during my two and a half year term. It has been a privilege to serve the NZMS in this way. I also thank the two retiring council members (Douglas Bridges and Stephen Joe) and wish my successor Rod Downey the very best for his time in office.

Graeme Wake
President (1999-2001)
(currently in Oxford!)

LOCAL NEWS

UNIVERSITY OF AUCKLAND

Department of Computer Science

John Hosking has been promoted to Professor of Computer Science.

Georgy Gimel'farb has received a Marsden Fund grant of $59000, for his research on "Randomness, self-organisation, and vision: stochastic modelling of image textures".

After writing two papers together Golbon Zakeri and Mark Wilson have produced their greatest joint work. Their first child Yusef has been born, weighing 4.16kg.

Seminars

Associate Professor John Hosking, "Visually consistent or consistently visual".
Professor Ralf Denzer, "Integrating distributed systems using meta information networks".
Tim Wright, "Collaborative and multi-paradigm programming for children".
Dr Peter Fenwick, "Zeckendorf integer arithmetic: from mediaeval leporine demography to modern metric conversions".
Professor Rod Downey (VUW), "Reals and randomness".
Professor Manfred Meyer, "Electronic business: How to change the economic landscape? ".
Professor S. S. Goncharov (Novosibirsk State University), "Computable and arithmetical numberings".
Peter Grundemann, "Software project management and team collaboration tool".
Michael Thielscher, "Programming of reasoning and planning agents".
Professor Michel Deza, "Fullerenes and generalizations: interplay between geometry and chemistry".
Professor Andre Gagalowicz, "Image analysis and synthesis collaboration"

Department of Mathematics

Congratulations to David Alcorn on his election to Senate.

Several members of this Department have obtained research grants from the Marsden Fund: Gaven Martin has

received $65000 for "Geometry and Analysis". Marston Conder, Jianbe An \& Eamonn O'Brien have received $54000 for "Effective computational approaches in group theory and applications". Geoff Nicholls & Dr R. D. Gray have received $130000 for "A phylogenetic approach to linguistic evolution in Europe and the Pacific". Ivan Reilly & Bill Barton have received $120000 for "The language dependence of concepts in mathematics". Vaughan Jones, Marston Conder, David Gauld, Gaven Martin \& Rod Downey (VUW) have received $87000 for "Interactions between branches of mathematics, with applications to biology, statistics and physics". That project had received previous grants, in 1995 and 1998.

Bill Barton got a RSNZ Promotions Award of $25000 for his Mathematics Enhancement Project in Manukau schools. He gave the Aldis Lecture 2001, on "Aldis was a gossip: why mathematics is like a soap opera".

Dr Alona Ben-tal and David Thomson are now Lecturers.

With the joint term of Bill Barton and Mike Thomas as Head of the Mathematics Education Unit coming to an end at the end of 2001, Maxine Pfannkuch has been appointed as Head for 2002 and 2003.

Recent visitors include Prof. Les Woods (Mathematics Institute, University of Oxford), Frank Barrington (Melbourne University), Eva Joblonka (Free University of Berlin), Maria do Carmo Domite (University of Sao Paulo, Brazil), Dr Alan Bishop (Monash University), Dr Johann Engelbrecht (University of Pretoria) and Dr Leigh Wood (University of Technology, Sydney).

Sanja Todorovic-Vasiljevic had her PhD oral examination, and the three examiners have recommended that Sanja be awarded the degree of PhD, subject to making some minor corrections to her thesis, on "Bounds on the number of automorphisms of a compact non-orientable surface of given genus".

Grant Emms is to be awarded his PhD for his thesis on "Active sound power absorbers: their effect on soundtransmission through openings". This must be the first time that a thesis in this Department has had two Professors of Mechanical Engineering as external examiners! Grant's thesis won substantial praise from all examiners.

Dr Alona Ben-tal, Dr Andrei Korobeinikov and Dr Kerry Richardson have each been awarded a NZ Science & Technology Post-Doctoral Fellowship. Alan Gil Delos Santos, who is currently studying for a PhD in Mathematics Education, has been awarded a University of Auckland International Fees Bursary from 2002. This fees scholarship is tenable for up to 3 years.

The LOGOS#10 conference on "Research Issues in Statistics Education and Statistics in the New Zealand Mathematics Curriculum" was held on September 3.

Paul Bonnington was an invited speaker at the Graph Embeddings and Maps on Surfaces Conference, Bratislava, Slovakia. He has visited and presented talks at the following places: Denmark Technical University, Lyngby, Denmark; University of Ljubljana, Slovenia; Slovene Graph Theory Conference, Bled, Slovenia; University of Syracuse, New York; and the University of Vermont. He is now Managing Editor of the Australasian Journal of Combinatorics.

Bruce Calvert atended ANNES' 2001, and he visited the Electrical Engineering Department at the Technion in Haifa.

Marston Conder spent a month in Europe, where he was an invited speaker at a conference on "Finitely-presented groups: questions and algorithms" at Trento (Italy), and he gave a series of invited lectures on "Group actions on graphs, maps and surfaces with maximum symmetry" at the quadrennial Groups-St Andrews meeting held in Oxford in August.

Colin Fox has set up his annual Spring Camp on the sea ice off Antarctica, to observe its breakup.

David Gauld, Sina Greenwood & David McIntyre attended the following conferences: Summer Topology Conference, New York, Nordic Conference on Topology and its Applications, Nordfjordeid, Svalbard Geometric Topology Conference, Longyearbyen, Norway, and the Prague Topological Symposium at Prague. Brian van Dam, Abdul Mohamad and Jiling Cao also attended the Prague Symposium. David Gauld visited Zbigniew Piotrowski in the northern tip of Poland, where they worked on some topology.

David McIntyre visited Toronto, Oxford and Pittsburgh, and also he gave seminars at the National University of Ireland (Galway), at University of Pittsburgh and at Youngstown State University (USA).

Eamonn O'Brien participated in a conference on "Finitely-presented groups: questions and algorithms" at Trento (Italy), and in the quadrennial Groups-St Andrews meeting held in Oxford in August, and he gave an invited survey lecture on his work at the Computational Group Theory meeting at Oberwolfach at the end of July.

Arkadii Slinko is now taking condensed leave, during which he has attended a Workshop and a Conference on "Coding Theory and Data Integrity", organised by the Singapore National University. He visited the Departments of

Mathematics and of Economics at Bilkent University of Ankara, mostly working on his research project with his coauthor Prof S. Koray.

At the Colloquium 2001, held at Massey University, members of this Department gave the following Contributed Talks:

Dr Alastair McNaughton, "The fractional differentiation of trogonometric functions".
Professor J. C. Butcher, "The stability of some numerical schemes".
Dr Robert P. K. Chan, "Symmetric symplectic Runge-Kutta Nystrom methods for Hamiltonian problems".
Nicoleen Cloete, "Stochastic processes in the development of a genealogy".
Professor Marston D. E. Conder, "Hurwitz groups with given centre".
Professor David B. Gauld, "Metrisability of manifolds in terms of function spaces".
Jinhua Gong, "On quasi-conformally homogeneous manifolds".
Dr Paul Hafner, "On the graphs of McKay-Miller-Siran".
Dr Allison Heard, "Stability for variable stepsize numerical methods for ordinary differential equations".
Nicolette Moir, "A new `fifth' order method for solving ordinary differential equations".
Dr Steve Taylor, "Boundary control of a Timoshenko beam".
Garry J. Tee, "Surface area of ellipsoid".
Brian Van Dam, "The construction method of resolutions and Dowker spaces".
Will Wright, "Some practical general linear methods".

Brian Van Dam won the Aitken Prize for his talk.

Seminars

Professor Les Woods (Mathematics Institute, Oxford University), "Accelerating the solar wind".
Dr Chris Breen (University of Capetown), "Researching one's own practice: tales of an addict".
Professor Dr Rolf Biehle (Kassel University, Germany), "Assessing statistical competence with tests and interviews".
Dr Darlene Heuff (University of Canterbury), "The preferred scale of convection".
Dr Frank Barrington (Melbourne University), "Successes and failures in first year mathematics curriculum".
Professor Johann Engelbrecht (University of Pretoria), "Mathematics is not for grown-ups".
Professor Michael F. Newman (ANU), "Constructing Lie algebras".
Rosheen Gray (Senior College, Auckland), "Current research studies in Australasia: A teacher's perspective".
Dr Eva Jablonka (Free University of Berlin), "Applications of mathematics: what do we really want students to learn?"
Brian Van Dam, Dr Abdul Mohamad and Professor David Gauld, "The Prague Topology Symposium".
Dr Yu Hayakawa (VUW), "Bayesian nonparametric testing of constant versus nondecreasing hazard rates".
Dr Bill Barton, "Aldis was a gossip: why mathematics is like a soap opera"
Dr Abdul Mohamad, "Symmetric Heath functions".
Camille Nakhid, "Developing an appropriate research methodology for explaining Pasifika students' underachievement in mathematics"
Jamie Sneddon, "Tournaments---domination and embedding".
Dr Sina Greenwood, "The Svalbard conjecture".
Fiona Ell, "Representations and thinking: teaching and learning multiplication".
Dr Alexei Filinkov (Adelaide University), "White noise approach to interest rate models".
Professor Cheryl Praeger (University of Western Australia), "Computers in algebra: new answers, new questions".
Dr Dane Flannery (University College Galway), "Classifying irreducible monomial linear groups".
Professor Dr Willi Doerfler (University of Klagenfurt, Austria), "Symbolising actions as a way to mathematical concepts"
Dr David Robinson (King's College, London), "An introduction to generalized differential forms".
Anna Torstensson (Lund University), "Lowest index common subgroups of commensurable Bianchi groups and tetrahedral groups".
Nicole Roper, "The mathematics behind applications with social interest".
Nicoleen Cloete, "Stochastic processes in the development of a genealogy".
Dr Mike Thomas "Mathematical representations: procedural and conceptual interactions".
Professor Boris Pavlov, "The Merchant problem, the Turing barrier and quantum computing".
Dr Lawrence M. Wein (MIT), "Some mathematical models of cancer treatment".
Dr Ville Kolehmainen (University of Kuopio, Finland), "Optical tomography in breast cancer detection".
Shehenaz Adam, "Ethnomathematics in the Maldivian curriculum: an inquiry representational fluency and symbolisation of derivative".

Department of Statistics

Chris Wild and Alastair Scott gained a Marsden Fund grant of $80000, for "Methods for response-selective, missing data and complex sampling \linebreak problems".

Marti Anderson and Dr C. E. Diebel (Auckland Museum) received a Marsden Fund grant of $50000, for "Statistical

models for environmental impact assessment: fauna in kelp plants as marine indicators".

Seminars

Dr Nick Fisher (ValueMetrics~~Australia), "Mode testing via the excess mass estimate"
Dr Peter Smith (University of Canterbury), "Random matrices in communications Engineering".
Dr Yu Hayakawa (VUW), "Bayesian nonparametric testing of constant versus nondecreasing"
Dr Ilze Ziedins, "Markov random field models of multicasting in tree networks".

Applied Probability & Applied Mathematics Joint Seminars

Professor Geoff Austin (Physics), "The statistical description of clouds and rainfall".
Associate Professor Andy Philpott (Engineering Science), "Optimisation in electricity pool markets".
Dr Mark Bebbington (Massey University), "Stochastic models of regional seismicity".
Professor Mike O'Sullivan (Engineering Science), "Computer modelling of geothermal fields".
Dr Mark Bebbington (Massey University). "Stochastic models of regional seismicity".

Garry J. Tee

UNIVERSITY OF CANTERBURY

Department of Mathematics and Statistics

Congratulations to Paul Shorten, one of our graduates PhD (2001), who has just been awarded the prestigious Hatherton medal: for the best scientific paper by a student registered for a PhD degree at a New Zealand University in Physical Sciences, Earth Sciences, and Mathematical and Information Sciences.

From the Royal Society Newsletter 21/11/2001: Dr Shorten's paper is in the subject of biomathematics. It investigates the mathematics of hormone transport a "perifusion system"---an experimental tool used to model information transfer in endocrine systems, and shows how experimental data obtained should be understood. This paper involves new mathematical theory that has significant practical applications in medical science. This combination of theory feeding into practice represents a very impressive achievement."

Graeme Wake is currently visiting University of Oxford (All Souls College and OCIAM), joined by PhD student Bernie Tsang just for Michaelmas term. He is leading a Mathematics in Agriculture workshop in UC Davis in California in the first week of December, playing hooky from the Colloquium, being the fifth he has missed since they started in 1966! He reports life in Oxford is great.

Seminars

Professor J W P Hirschfeld, "Codes, curves and zeta functions".
Professor Graeme Wake, "Burn out and blow up".
Dr Douglas Rogers (University of Hawaii), "Derangements and (0,1)--matrices with line sum two".
Dr Douglas Rogers (University of Hawaii), "Picture counting with generating functions".
Professor J J Deely (Purdue University), "A Bayesian approach to blinded sample size re-estimation using interim data from a clinical trial".
Dr Philip Meguire, "Discovering boundary logic".
Associate Professor Chris Llyod (Australian Graduate School of Management), "Confidence limits. Are they correct, are they best, are they computable?".
Associate Professor Kuldeep Kumar (Bond University), "Pade approximation and its application in time series analysis".
Maria Angeles Carnero (University Carlos III), "Detecting level shifts in the presence of conditional heteroscedasticity".
Dr Mark Hickman, "From black holes to braided rivers or matching curves under the projective group".
Professor K I Beidar (National Cheng-Kung University), "On automorphism groups of certain triple systems".
Professor Douglas Bridges, "The constructive theory of apartness spaces".
Taweesak Siripornpibul, "Survey designs and compensation methods for nonresponse problems".
Associate Professor Rick Beatson, "Radial basis function methods for 3D applications: fast evaluation of 3D polyharmonic splines".
Dr Tim Marshall (University of Prague), "Graph homomorphisms and vertex colourings".
Dr Shayne Waldron (University of Auckland), "Jacobi polynomials on a simplex (and their reproducing kernel)".
Dr Manesh I Gupta, "A story of quantum error correction".

Chris Price

INDUSTRIAL RESEARCH\\ LIMITED

Applied Mathematics Team

We have four students with us for the summer this year, ensuring that office space is at a premium. Matthias Kleiser is a scientific computing student from Heidelberg and is working Roger Young on composite ceramics. Joanna Atkin is a maths-physics student from Victoria and is working on granular mixing problems with Graham Weir. Guy Baldock, also from Victoria, is studying geophysics and is working with Stephen White on wave propagation in logs. Finally, Stephanie Reid is another Victoria mathematics student and is working with Kit Withers on channel capacity for multiple antenna systems.

Graham Weir gave seminars at Oxford and Surrey in a visit to the UK in October. On the same trip he delivered consulting reports at the Hague and in Houston. Stephen White attended a meeting at Lawrence Berkeley Laboratory in California and also visited the Utah Geological Survey. In November there was an Advanced Materials Workshop held at IRL on November. The Applied Maths team presented three posters in total (one on Composite Ceramics, another advertising the new finite element package ANSYS and a third poster on Computer Simulation of Materials). Shaun Hendy gave a talk at the workshop on "Computational Materials Science".

Shaun Hendy

MASSEY UNIVERSITY

Institute of Fundamental Sciences

Mathematics

By the time you receive the NZMS newsletter some (hopefully most) of us will have met at the Colloquium hosted by Massey. The preparations for the Colloquium are progressing according to plan. We have control over this but unfortunately not over the weather.

Semester 2 has been busy with no break for us. During the only one-week break most of us were involved with one or more Contact Courses. So no time for escapades. Then before most exams were marked Semester 3 sprang upon us. Three first year papers are offered extramurally and this year for the first time Calculus 1.

*From the Evening Standard, Thursday the 22nd of November: "**Students flock to Massey**. Massey's international students numbers are up 35 percent across its three campuses, with Palmerston North showing strongest growth."*

The College of Business have signed up a deal with China and 500 students will come here. These students have to be housed on the campus so more hostel space is required. This gave rise to the so-called `Domino Effect'. The former Pink Hostel now occupied by Accountancy will be reverted back to a hostel for overseas students. So Accountancy ® Computer Science (Statistics in a year or so) ®PVC of College of Sciences plus 15 entourage ®HoD of IFS plus Admin ®Mathematics. As the admin staff appears to be growing (exponentially?) more offices are required which meant that good lecture rooms and a part of our Common Room had to be sacrificed.

"Enrolments are also popular for Massey's summer school programme with 4800 students (635 EFTS) signed-up for the November to February courses."

More EFTS for Palmerston North but no more staff (as yet) to handle the extra work in semester 3. We are told to do research (otherwise no promotion), be excellent in teaching, apply for grants and become wizards in designing web pages. In other words workloads keep on increasing but staff numbers have been decreasing steadily over the last years (exponential decay curve). Remember the re-positioning exercise?

As Mike Carter has reduced his hours by 20\% percent (since August) and Gillian has opted to work half time from January next year we were allowed to advertise for a lecturer. Marijcke has been appointed as a lecturer (0.8) from January next year.

Congratulations to Charles who has been promoted to Associate Professor. Charles is currently at the Georgia Institute of Technology in Atlanta. He has given an invited address at a conference at Clemson University on November 8. Charles also enjoyed his visit to Andrew Vince at the University of Florida and Vanderbilt University in Nashville. Charles and Barbara have visited the mountains in the northern part of Georgia. They got to the top of Springer Mountain. Charles thinks the Americans are not as used to walking as we are in New Zealand. The sign said that the walk was 6 hours one way, but they reached the top in 3 hours and 20 minutes at a very leisurely pace. They will be leaving Atlanta on December 22, and travel back via Canada, Britain, Austria, Italy, Oman and Singapore and are expected back in Palmerston North by late January.

We welcome Dr Dietmar Cieslik, from the Institute of Mathematics and Computer Science, University of Greifswald, Germany. Dietmar has been assisting us with our teaching program. He is also involved with our research group in BioInformatics.

Travel report from Paul Gardner: "On July 28 at the obscene hour of 6am I exited Wellington airport bound for a week in Vienna (Austria) followed by a month in Sundsvall (Sweden). Highlights of Vienna were presenting a seminar to the people from the theoretical biochemistry group at the University of Vienna. This is an incredibly

prolific group of people involved in the field of computational biology. Also the fountains in Rathausplatz, the Museum of Natural History (Naturhistoriches Museum) and Stephansdom were well worth visiting. On August 6 I arrived in the bustling Swedish town of Sundsvall. I spent the next month hunting for an elusive group of molecules in the Yeast genome known as H/ACA snoRNA. This problem has been aptly likened to searching for a needle in a haystack. This work has resulted in some very likely looking candidates that are now waiting biochemical verification of their validity. Highlights were presenting seminars at Mid Sweden University, Sundsvall and the Department of Molecular Biology and Functional Genomics, University of Stockholm. Also a ferry trip around Stockholm, The Vasa Museum and the Pizza Place across the road from City Backpackers were worthy of a mention."

On the 9th of August Fiona and Robert became proud parents of Helena who weighed about 4 kg. Our sincere congratulations to Fiona and Robert!

Barbara left us in October to take up a postdoc position within the `Lehrstuhl für Spezielle Zoologie' in Bochum, Germany. While in Oberwolfach Barbara successfully defended her thesis titled "Evolutionary Analyses of Large Data Sets: Trees and Beyond". Congratulation Barbara!

From Barbara: "Oberwolfach is as nice a place as one could hope for to sit an oral exam. It's a tiny little village in the Black Forest that just happens to have a world renowned mathematics institute. Andreas Dress and Bill Martin had organised a conference at the Institute for mathematicians and biologists interested in phylogeny and evolution. Mike Hendy decided that it would be a good idea to take advantage of the fact that my New Zealand examiners (Mike Steel and David Penny as a proxy for Mike Hendy) and I were going to be in Germany, and so Mike arranged for me to sit my oral exam during the conference. The Institute has been dedicated to running small mathematics conferences for the last 50 years or so, and has hit open what I feel is the perfect atmosphere for research. This includes regular lavish meals and plenty of wine and beer. As might be expected this put everyone, including my examiners, in a good mood, and the exam turned out to be a relaxed affair. A pass with minor emendations required. The conference was an excellent start to my new job in Bochum, and put me in touch with many people within Germany who are working on mathematical aspects of phylogeny. The group that I now belong to at Bochum University are interested in the phylogeny of Metazoans and are anxious to understand why the evolutionary trees that result from methods based on DNA sequences make little sense in terms of the morphology of the creatures, that is, they require many complicated features to be evolved in parallel rather than stemming from a single ancestral species. While here I expect to be working mostly on analysing what effects can cause biases in tree construction methods and on developing exploratory data. Analysis tools that are not restricted to outputting a single tree, but rather try to show all the signals in the data."

In September Mike Hendy travelled to Aarhus in Denmark to participate in the first Workshop in BioInformatics, (WABI2001) organised under the umbrella of EATCS (the European Association for Theoretical Computer Science. He went on the expectation that he would be the only participant from the Southern Hemisphere, so was pleasantly surprised to meet Nicoleen Cloete, a PhD student from the Maths Dept of Auckland University, who had also made the journey. Travelling by train from Copenhagen was complicated by the fact that there was a World Soccer cup qualifier between Ireland and Denmark (result 1-1 draw), and all the trains were fully booked. Aarhus is a beautiful old Viking port and brewing town on the Jutland peninsula.

He met up with Benny Chor, his Israeli collaborator, and they presented a joint paper. On his return, Mike spent a day at the Bioinformatics Centre at the National University of Singapore, a well funded new research group which is also very successful at setting up spin off companies to exploit their research.

We welcome Katie Hüber and Vincent Moulton from the Mid Sweden University - Sundsvall. They will attend the Colloquium and will be doing research at Massey till the end of this year.

Seminars

Peter Read (Department of Applied Economics), "Climate change issues".

Graduate Seminar Series

Seung-Hee Joo, "Contact systems and contact integrators"
John Hudson, "Grammars".
Anthony Poole (Institute of Molecular BioSciences), "An Achilles heel for genomics"
Padma Senerath, "Finsler Spaces".
Paul Gardner, "Functional differential equations: Hunting for functional RNAs"
Richard Love (Institute of Food, Nutrition and Human Health), "Investigating the effect of viscoelasticity on a continuum mechanics model of bread dough sheeting"

Marijcke Vlieg-Hulstman

UNIVERSITY OF OTAGO

Department of Mathematics and Statistics

What a lot of things have happened in the last year. Most notable is the recent release of *Shaping the Funding Framework, the Fourth Report of the Tertiary Education Advisory Commission*, which, if accepted, will totally change the face of tertiary education in New Zealand. There are good parts to the document, e.g. review of cost categories, and worrying parts, e.g. manipulative funding factors that could lead to volatility in the sector, and here is not the place to go into them, but suffice to say that our HoD has spent a fair amount of time considering them along with others at the University of Otago. Vernon is apparently still chained to his desk; in the couple of months since the last Newsletter he has chaired the review of a department, participated in a planning forum, attended many University and some national meetings, run the department, and done a little (and I mean a little) of the things for which he was originally employed, e.g. research and teaching.

Dr William (Bill) A. Link left the Department in November after spending most of the academic year teaching in Statistics. Bill is a mathematical statistician at the Patuxent Wildlife Research Center in Laurel, Maryland, and his visit arose through an agreement between the University of Otago and the U.S. Geological Survey, an Agency of the Department of the Interior. While at Otago, Bill collaborated with Richard Barker and other statisticians on the development of statistical methods for wildlife populations. Bill was a popular visitor who we hope to see again soon.

Coralie Daniel's mathematics-inspired scarf exhibitions were picked up by the producers of TV One's "Mercury Lane" and a cameo picture on her work and her links with the University of Otago was included in the section of the programme shown at Labour Weekend. She held an exhibition of her scarves at the University of Otago's Auckland Centre in late October and was rewarded with many positive and interested responses from people who visited. She greatly appreciated the support of her exhibition given by Auckland members of NZMS, the Maths Education Unit, and others involved in teaching maths in Auckland.

Josh Downer, PhD student in applied mathematics left the Department at the end of September to take up a position at EMBL-Monterotondo near Rome, Italy. Not a bad place to finish off a thesis, but the pressure to sip Frascati, eat fettuccine and enjoy life could be inhibiting progress slightly.

Tony Dixon, who left the Department last year and is now working in Australia, has had a son, Conor William Tony Dixon. Conor was born at 1.46 a.m. on Sunday 18th November, weighing in at 3.9 kg (8 lbs 10 oz). He was 53 cm (21") long, and Tony said, "I'm sure I heard him say that his favourite sports team is the All Blacks. Mother and Conor are healthy and well. Mother wants more sleep though. And father can't take the smile off his face."

In early September, John Clark attended a conference in Prague, Czech Republic, entitled "Some Trends in Algebra". This is a biennial conference organized by the Department of Algebra, Charles University, and this year the main focus was category theoretic, homological, set-theoretic and model-theoretic methods in the theory of rings and modules. It attracted speakers from around Europe, North America, and even New Zealand!

John Harraway attended the 53rd Session of the International Statistical Institute (ISI) and a Satellite Meeting of the International Association of Statistical Education (IASE) on Statistical Literacy in Seoul, Republic of Korea from 20-31 August.

Seminars

Professor Johann Engelbrecht (Department of Mathematics \& Applied Mathematics, University of Pretoria), "Mathematics is not for grown ups".
Murray Efford (Landcare Research, Dunedin), "Animal population density: what is it and how can it be measured?"
David Fletcher, "Modelling Skewed Data with Many Zeros: A simple approach combining ordinary and logistic regression".
Darryl I MacKenzie (North Carolina State University), "Darryl and Kerry's excellent US adventure!".
Allan McRae, "Application of mixture distributions to quantitative genetics: an approach using norms of reaction".

Lenette Grant

UNIVERSITY OF WAIKATO

Department of Mathematics

Congratulations to Warren Moors on being awarded the 2001 New Zealand Mathematical Society Research Award. He is the first person from our department to have ever received this award. Well done, Warren!

Congratulations also to Kevin Broughan on being made a Fellow of the Society. Kevin is currently in Poland attending the Dynamical Systems---Theory and Applications conference. His term as Chairperson ends at the end of the year.

The new Chairperson of the department will be Ian Craig. Ian was an invited speaker to the IAGA-IASPEI Joint Scientific Assembly which was held in August in Hanoi. IAGA is the International Association of Geomagnetism and Aeronomy while IASPEI is the International Association of Seismology and Physics of the Earth's Interior.

Ian's postdoctoral fellow, Paul Watson, has accepted a position at the University of Texas in Austin and he will be leaving us in the near future. Ernie Kalnin's postdoctoral fellow, Jonathan Kress, will also be relinquishing his position. He will be taking up a position in the School of Mathematics at the University of New South Wales.

Ernie is still on his study leave and is due back just before Christmas. Since the last column in this newsletter, he has made visits to the Centre de Recherches Mathématiques at the University of Montreal as well as the Max-Planck Institute in Stuttgart.

Stephen Joe, Rua Murray, Sean Oughton and a few students attended the 2001 Colloquium held at Massey University recently. Stephen also attended the Oberwolfach workshop on numerical integration and its complexity which was held in November. On the way home, he presented a seminar at the Kong Kong Baptist University.

Seminars

K. Snow, "Discontinuous and continuous time arbitrage pricing".
S. Morris (University of California, Berkeley), "Edge waves and the growth rate of instabilities in an aluminium reduction cell".
S. Morris (University of California, Berkeley), "Contact angles for evaporating liquids predicted and compared with existing experiments".

Stephen Joe

VICTORIA UNIVERSITY OF WELLINGTON

School of Mathematical and Computing Sciences

Geoff Whittle has been appointed to position of Personal Chair, in recognition of his exceptional scholarly achievements. Here is an extract from the VicNews item:

"A Personal Chair carries the title of Professor, and is a special recognition of outstanding research and scholarly achievement together with meritorious performance in teaching and other service to the University. The appointments are made on merit and are outside of the regular promotion exercise.

Professor Geoffrey Whittle is recognised internationally for his work in highly theoretical discrete mathematics, and in particular the theory of matroids---one of the deepest and most difficult areas of mathematics. He has been the recipient of two consecutive Marsden Fund Research Grants, and has had papers published regularly in the Journal of Combinatorial Theory Series B, the world's premier journal in discrete mathematics."

[The present correspondent wishes to point out that the official statement should have mentioned Geoff's 1996 New Zealand Mathematical Society Research Award, as well as his being an Editor of two prestigeous international journals, *Advances in Applied Math.* and the aforementioned *J. Comb. Theory B*].

Just a week later, newly promoted Professor Geoff Whittle was elected a Fellow of the Royal Society of New Zealand. Congrulations to Geoff on his double success!

Ross Renner stepped down as Head of School on December 1 and will return to the statistics fold after a well earned leave in Canada, Japan and Fiji. This will bring the statistics group back up to full strength for the first time in over 2 years!

Peter Donelan has been appointed Head of School and moved downstairs to the HOS office vacated by Ross Renner, who retired to the tranquility of the fifth floor.

Chris Grigson was farewelled at a tea party in his honour held on Thursday, December 6.

Mark McGuinness got a promotion within the Reader scale. He is presently overseas on Study Leave, visiting Southampton, Nottingham, Oxford, Brisbane and Melbourne, in that order. He returns to work in mid February, after attending the Mathematics in Industry Study Group in Adelaide. He is accompanied by his family, and presently enjoying frosty temperatures in Oxford, which seems to be full of antipodeans at the moment. Quite a change from the balmy temperatures on Ischia, an island paradise in the bay of Naples, where he was recently attending a conference on the oceanography of the Ross Sea, Antarctica. He is finding the visit to the UK and Europe very useful, with a number of academic collaborations resulting.

Mark reassumes the position of Programme Director in maths on his return from and Geoff's departure on research and study leave.

James Noble and Ewan Tempero were promoted in Computer Science but sadly Ewan is leaving anyway for an AP at Auckland---we wish him well.

James Noble, Rod Downey and Mark McGuinness were successful in the latest round of the Marsden Fund.

James was awarded a one of 20 Fast Start grants (only 3 in the Mathematical and Information Sciences) for work on *Ownership and aliasing for object-oriented systems*.

Rod's grant is to study *Randomness, computability and complexity*.

Mark McGuinness is an Associate Investigator for, *The freezing of land-fast sea ice during the Antarctic winter* with Tim Haskell at IRL and Pat Langhorne at Otago.

Dong Wang has been appointed to a permanent position as senior lecturer in statistics.

We welcome Dr. Richard Arnold formerly of Statistics New Zealand who joined us in November. Richard's special interests are biostatistics and epidemiology.

Marcus Frean has been appointed SL in Computer Science, after working in 1/3rd capacity while completing his Marsden grant studying evolution of cooperative systems, and Kris Bubendorfer has been appointed a lecturer - he is just completing a PhD under John Hine's supervision working in distributed systems.

Rob Goldblatt spent November at the Japan Advanced Institute for Science and Technology (JAIST), near the city of Kanazawa on the Japan Sea coast. The visit was supported by the Japan Society for the Promotion of Science. JAIST is a relatively new institution, founded in 1990, which consists of researchers and graduate students working mostly in the information sciences and materials science. Rob gave a series of lectures on modal logics of computation to students from the computational logic laboratory headed by Professor Hiroakira Ono, and a seminar on his research on the logic of coalgebras. He also spoke at a logic workshop held at Tsukuba University, north of Tokyo.

Matthew Hennessy will be joining the School as a Visiting Professor in the Centre for Logic, Language and Computation (see http://www.cllc.vuw.ac.nz/) for the first half of 2002, from late January to late June.

Matthew is Professor of Computer Science in the School of Cognitive and Computing Sciences, University of Sussex, UK. He is a leading person in computer science theory, working in the semantic foundations of programming and specification languages, with particular interests in distributed computing, including mobile computing, and the development of verification tools.

Rod Downey gave seminars in Leeds and Oxford and attended the Dagstuhl seminar on computable analysis. Rod began his term of office as President NZMS.

Catherine McCartin, one of our PhD students supervised by Rod, has accepted a lectureship at Massey.

Sebastiaan Terwijn is visiting us from The Netherlands. His area of interest is algorithmic randomness and will be visiting Rod on Marsden grant money.

Jim Geelen, University of Waterloo, Canada, is visiting Geoff Whittle from October 1 2001 to Feb 1 2002. Neil Robertson, Ohio State University, is visting from 1 Jan 2002 to 15 Feb 2002, Bert Gerards, CWI Amsterdam, is visiting from 15 Jan 2002 to 7 Feb 2002.

Professor Emeritus John Harper gave a talk at NZMC2001 and was re-elected Secretary/Treasurer of ANZIAM NZ Branch.

Dr Hayakawa is currently on leave in Hong Kong and Japan and recently met up with emeritus Professor David Vere-Jones in Tokyo. Megan Clark prepared an expert opinion (with Professor Cedric Hall from Education) on behalf of the Equal Opportunities Commission of Hong Kong in their case against the Department of Education there relating to the scaling and selection processes used to allocate places in secondary schools. The case was won! Emeritus Professor Vignaux has had a busy six months, firstly in Argentina (where he was pickpocketed!) and currently he is presenting a paper in Stuttgart. John Haywood has almost single handedly got the new Wellington Statistical Association off the ground (from an idea of David Vere-Jones) and it is now flourishing, providing a forum for all practitioners of statistics in the region to meet and share views and problems.

Vladimir Pestov has visited a number of Universities and research centres in the US, Brazil, and Canada and attended a couple of small conferences in Australia.

The University recently launched its new Bachelor of Information Technology 4 year degree involving computer science staff. Information Technology Minister Paul Swain did the honours and Professor John Hine presented information about the degree.

Seminars

Alistair Windsor (Penn State University), "Time changes of the linear flow on the torus".
Marcus Frean, "Rock-scissors-paper and the survival of the weakest".
Douglas Rogers (University of Hawaii), "Picture counting with generating functions".
Tim Wright (University of Canterbury), "Collaborative and multi-paradigm programming for children".
Kris Bubendorfer, "Resource negotiation in nomad".
Barry Blundell (Massey University, Albany), "Working with innovative 3-D systems ".
Tony Vignaux, "An ounce of analysis---or a metre of maths?".
Catherine McCartin, "Good ways to arrange graphs".
Ross Renner, "Modelling and analysis of geochemical compositional data: Heavy metal pollution in the Baltic".
Rod Downey, "Algorithmic randomness, computability, and reals".
Shirley Pledger, "Using mixtures to model heterogeneity in capture-recapture models".
Ed Mares, "What I learned on my vacation".
Ben Martin (University of Sydney), "Spaces of representations of finitely generated groups".
Evan Griffiths, "Constructing random reals".
Tracy Bai, "Simple models for interferer powers".
Nuovella Williams, "QTL mapping: Finding trait-controlling genes in a genomic haystack".
Lawrence M. Wein (MIT's Sloan School of Management), "Two operations research problems in medicine".
David Gauld (The University of Auckland), "Manifolds, metrisable and non-metrisable".
Leon Reznik (Victoria University, Melbourne), "Fuzzy system design and implementation".
Matt Visser (Washington University, Saint Louis), "From Lagrangians to pseudo-Riemannian geometry: Modelling Einstein's gravity".
Tony Vignaux, "Some examples of dimensional analysis in OR and statistics".
Gareth Cranefield, "Simulating spatial ecologies".
Brett Calcott, "Computer simulations of animal behaviour".
Yinhuo Zhang (University of the South Pacific), "Brauer groups and quaternion algebras".
Jan Kratochvil (Charles University, Prague), "Complexity of locally constrained graph homomorphisms".

Mark McGuinness

FEATURES

NEW ZEALAND MATHEMATICAL SOCIETY
PRESIDENT'S REPORT 2000--2001

This report covers the year from the last NZMS Annual General Meeting in November 2000 to November 2001.

VISITING LECTURERS

1. **Forder Lecturer 2001**
   The highlight of the year was the visit of Dr Tom Körner of Cambridge University who travelled through NZ in July 2001. His tour was very successful and all University centres were included. We were pleased to also coordinate arrangements for him to be an invited speaker at the NZ Association of Mathematics Teachers Conference in Wellington in the first week of July. We thank Dr Peter Fenton, who coordinated the overall tour, and the local contacts in the six centres. Very successful publicity was achieved for mathematics as a result of his visit.
2. **Future Forder Activities**
   Future Forder activities are assured. The London Mathematical Society are firmly behind the scheme (as is NZMS), and if the British Council support is lost ($2500 in 2001), which is possible, the LMS will not require any refund. I was privileged to represent NZMS at the annual LMS dinner in London in November at which the scheme was spoken of warmly. The potential loss of $1250 for us needs discussion.
3. **Forder 2003**
   Both Councils approved the appointment of Professor Caroline Series (University of Warwick) as the Forder Lecturer in 2003. I had the pleasure of briefing her on the details at a meeting in Warwick earlier this month. She is currently planning for her visit to New Zealand to be in September-October 2003.
4. NZMS Lecturer
   The year 2002 represents the 25th anniversary of the NZMS Lectureship, which now alternates with the Forder Lecturer. The Council will hopefully be appointing a NZMS Lecturer in the near future.

MEMBERSHIP

We have been actively recruiting members this year and we are urging members to bring membership to the attention of colleagues, students, etc. The promotion of the Society and Mathematics generally remains a priority of Council. Our membership is now 242 just a little up from 239 in 2000. A form for membership is available in each newsletter.

Two new accreditations for the Fellowship of the NZMS are to be awarded during the 2001 NZ Mathematics

Colloquium. We congratulate these members and commend this opportunity to other potential Fellows.

NZMS RESEARCH AWARD

The award for 2000 was to Dr Graham Weir of Industrial Research Ltd for his work in applied mathematics covering a plethora of applications. This is the first time that the award was given to a non-University based person.

The outcome of the 2001 Award round will be announced at the colloquium dinner in December. The Council approved an independent panel of three leading New Zealand mathematicians to assist in the recommendation. Thanks to those who assisted us with the process. Nominations for the 2002 Research Award will remain open until 31 March 2002.

AITKEN PRIZE

This prize is for the best talk(s) by a student at the Colloquium. At the November 2000 meeting in Hamilton, there were three joint winners:

Barbara Holland, Massey University, "Median networks: a visual representation of ancient Adelie penguin DNA"
Patrick Rynhart, Massey University, "Static liquid bridges".
Sivajah Somasundaram, Waikato University, "Cover semi-complete topological groups"

The quality and number of student talks is pleasing and augurs well for the future vigour of our subject. We thank those who served on the panel.

GRANTS

Council made the following grants between 20 November 2000 and 20 November 2001:

Research grants	1,400.00	(3 grants)
Student grants	2,500.00	(6 grants)
Maths Colloquium 2000	2,500.00	(NZMS speaker $1500: Student support $1000)
Delta Conference 2003	400.00	(Teaching of Undergraduate Mathematics)
NZ Journal of Mathematics	1,000.00	(This is for 2000-2001: There is another $1000 due soon for 2001-2002)
	7,800.00	

MATHEMATICAL AND INFORMATION SCIENCES ADVISORY COMMITTEE, RSNZ

1. Council appointed the President and Professor Gaven Martin (Auckland) as the NZMS representatives on this Committee for 2001. A meeting was held in March 2001, which discussed among other things:
    - Funding
    - Promotion of Mathematics
    - Conference Coordination

   Professor Jeff Hunter concludes his term as Chair of MISAC in early 2002. We thank him for his support and leadership. A large internal review of the RSNZ is underway which focuses on its role and links to member bodies. I attended a meeting to discuss this in July 2001. Generally the new Chief Executive of RSNZ is providing strong leadership in this direction.
2. **Fellowship of the Royal Society of New Zealand**
   In November 2001, the following member was elected to a Fellowship of the Royal Society of New Zealand:

   Dr Geoff Whittle, Victoria University of Wellington.

   We congratulate Geoff on his election.

RELATIONSHIP WITH AUSTRALIAN MATHEMATICAL SOCIETY

As reported last year, agreement has been made by the two Presidents to have observers at each otherÕs Council meetings. No Council member was able to attend the AGM of the Australian Mathematical Society in September 2001, but Professor Hyam Rubenstein is representing the Australian Mathematical Society at this yearÕs NZMS meetings, concurrent with his being an invited speaker at the Colloquium.

AUSTRALIAN--NEW ZEALAND MATHEMATICS CONVENTION

We have accepted the invitation to participate in another Convention with our Australian Colleagues within ICIAM2003, Sydney, 7-11 July 2003.

This will be the sixth ANZ Mathematics Convention the first being in 1978. It will give the opportunity of meeting

simultaneously with Australian Math. Society, ANZIAM, Operations Research Society of Australia, and the Australian Computational Techniques Conference. ICIAM is meeting in the Southern hemisphere for the first time in 2003. This conference is being hosted by ANZIAM, as a Division of the Australian Math. Society.

This was also accepted by the Colloquium Business Meeting in Hamilton on 27 November 2000. Council is currently considering an expanded scheme for grants to assist NZ based persons to attend.

ACKNOWLEDGEMENTS

Council Members: Professor Douglas Bridges and Dr Stephen Joe both complete their terms on Council at this time. We thank them for their many contributions to NZMS and Mathematics in New Zealand.

To all those Council Members continuing, I thank you for your ongoing support and look forward to the new members of Council from December 2001.

Thank you to all members of NZMS for your support of myself in the role as President, which is now concluded. The change in timing of the annual meeting from July at the beginning of my term in 1999 meant that my visiting appointment at the University of Oxford prevented my being able to attend the December 2001 meetings, for which I apologise. Nonetheless, I have used the opportunity of strengthening links with UK mathematics while being based in Oxford.

Graeme Wake
President

REFLECTIONS OF A FORDER LECTURER

So far as I and my wife are concerned, our recollections of our trip can be summarised as one long sigh of pleasure. The snow falling at Arthur's pass, Wellington harbour, the majestic dance of the Auckland traffic lights, the fish (to be eaten), the birds (to be glimpsed), the impish sense of humour of your randomly placed road signs announcing 15 kilometers of bends (surely it would be cheaper to indicate the occasional straight bits), the breath taking beauty of the northern coastline, the hospitality, the public toilet that played music to its users, the botanic gardens each more magnificent than the last, the silence in the forests, the actual room where Rutherford did his undergraduate experiments, ...

However, the your president does not want me to talk about the marvellous time I had. He feels, no doubt rightly, that a six week visit to New Zealand should have enabled me to discover the problems facing the New Zealand mathematical community and to work out what you should do about them. Since, contrary to his expectations, I have nothing very useful to say I shall do what all experienced teachers do. That is, I shall waffle a bit and hope that nobody notices the lack of content.

Any confidence I might have in my views is further undermined by the realisation that New Zealand is different. In Europe the museums exhibit acres of loot extorted by means of economic and military power. In New Zealand they show the typewriter used by the grandfather of Mr X and the feathered cloak worn by the grandfather of Mr Y. In the US, properly reverent guides show you the fine buildings where great statesmen, soldiers and intellectuals drafted founding documents which were to be a beacon for the world. In New Zealand, you wander at will over a lawn where a group of well meaning men tried to do the best they could for the communities they felt responsible for and ended up with a founding document.

In spite of the rugged particularity of New Zealand and its peoples, the worries of your mathematics departments seemed very familiar. There are two pieces of advice that I feel called upon to give -- one urging you to follow British practice and the other urging you not to.

The emerging British practice that I wish to commend to you is for universities to encourage school children to take an interest in mathematics. Since it is unnecessary to reinvent the wheel, the reader should locate NRICH, PLUS and their `Millennium project' siblings on the web. You will find, I hope, material to extend the mathematical experience of children of all ages. The material is both carefully crafted and free.

The British practice that I wish to advise against is the relentless spread of competition between universities. New Zealand is a small country and, if you divide your mathematical world into mutually competing fragments, the resulting splinter groups may not be large enough to form genuine mathematical communities.

Institutions like the Forder lectureship are very important. Knowledge travels better on foot than on paper. Let me conclude by thanking everybody who made my trip and that of my wife such a wonderful experience. Thank you New Zealand.

T. W. Körner

CENTREFOLD

David Gauld

David Barry Gauld was born at Inglewood on 28 June 1942. He graduated MSc (1st class Honours) from the University of Auckland in 1965. He then became a Fulbright student of topology under Robion Kirby at UCLA, where he gained his PhD in 1969.

David became a Lecturer in the University of Auckland Department of Mathematics in 1969, and he became Professor in 1981. He first became Head of the Department of Mathematics in 1981, and he is currently HOD, as he has been for over half of the 20 years since 1981. In addition to his three main terms as HOD he has been Acting Head of Department for various briefer periods. In 1991 David was Acting Acting Head of the Department of Mathematics & Statistics, sandwiched between on the one hand Alastair Scott as Head of Department with Ivan Reilly as Acting Head, and on the other hand George Seber as Acting Acting Acting Head with Chris Triggs as deputy Acting Acting Acting Head. He has been active on many university committees, and for the past few years he had been Associate Dean of Budgets for the Faculty of Science, and Associate Vice-Chancellor (Research). He was instrumental in getting Vaughan Jones appointed as Distinguished Alumni Professor, with much consequent benefit to the Department.

David's research interests are in set theoretic topology, especially applications to non-metrisable manifolds, and topological properties of manifolds near the limit of metrisability. He has published many papers since 1970 in numerous prominent journals and in proceedings of several conferences; and his text on "Differential Topology: an introduction" was published by Marcel Dekker in 1982. He has given many invited addresses on topology, at many places around the world. The RSNZ awarded him a New Zealand Science & Technology Medal for 1997. David and his research colleagues (Vaughan Jones, Marston Conder, Gaven Martin and Rod Downey) have received major Marsden Fund grants in 1995, 1998 and 2001 for their research on "Interactions between branches of mathematics, with applications to biology, statistics and physics". He is the founding secretary of the New Zealand Mathematics Research Institute, and he largely organized the first two summer camps, at Huia on Knots (1994) and at Tolaga Bay on Statistical Mechanics (1996). David advised Gaven Martin to go to the University of Michigan for post-graduate study, and since 1980 about 10 of our graduates have gone there for post-graduate study.

David traces his mathematical whakapapa back 6 generations to H. A. Newton, as do David McIntyre and Marston Conder and (5 generations only) Ivan Reilly. Several other mathematical descendants of H. A. Newton have visited this Department of Mathematics during the past decade. In 1999 four students completed their PhD degrees in topology at the University of Auckland, three supervised jointly by David Gauld and David McIntyre, and one supervised by Ivan Reilly. David supervised another student who completed his PhD in 2000, and he is currently supervising another PhD student.

David was President of the NZMS in 1981-1982, and he belongs also to the Mathematical Societies of Allahabad, Australia and USA. He has been active since 1977 on the Editorial Board for Mathematical Chronicle and then for The New Zealand Journal of Mathematics, he is a Member of the Editorial Board of Far Eastern Journal of Mathematics, and he is one of the Editors of Topology Atlas. For several years he has attended the Summer Topology Conference held in North America. He is now arranging for the first Summer Topology Conference in the southern hemisphere, to be held in Auckland in 2002 July 1--4. A web-site has been established at:

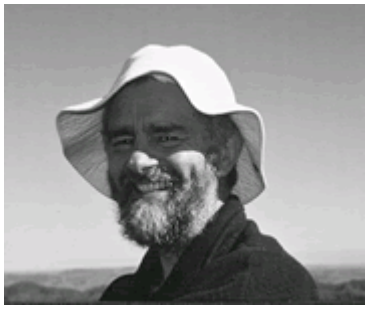
http://www.math.auckland.ac.nz/TOP2002

David is renowned for his enthusiasm for bush and stream tramping, especially in the Waitakere ranges and the Hunua hills. Vaughan Jones has gone tramping with David on various occasions, and he was impressed by David climbing mountains with bare feet. David is active in the Royal Forest and Bird Society of New Zealand, and he organizes annual excursions to the bird sanctuary on Tiritiri-Matangi Island.

In 1983 "The Mathematical Intelligencer" set a contest, to write a speech for a mathematician who had been captured by cannibals. When those cannibals learned that their intended meal was a mathematician, they offered to release him if he could give them a proof which they could understand, of some striking and novel theorem. David won the prize with a short speech giving a proof of the topological theorem that there must be at least one point in the ocean at which the mean tidal range is zero. A rough English translation of that speech was published in "The Mathematical Intelligencer" (vol.5, no.4, 1983), together with David's original text in Maori.

Mavin Vamanamurthy recalls that, in the late 1980s, he and David attended conferences in Analysis in Helsinki and Topology in Dubrovnik, respectively. "There was a fabulous dinner at the Dubrovnik conference where they served plenty of alcoholic drinks, but not soft drinks. David and I, being the few odd ones at the conference who only drank `healthy' soft drinks, had great difficulty convincing the servers that we had the right to be served orange juice and water, instead of alcoholic drinks! After much argument and delays finally we got what we wanted! I can't remember if we had to pay extra for soft drinks while alcoholic drinks were free!".

Vaman concludes that "David has been my closest friend, philosopher and guide in academics as well as in other aspects of life in this wonderful Kiwiland. I have learnt much on interactions between topology and mathematics analysis. We have written many joint papers, taught good courses together, written valuable lecture notes and contributed our little share to mathematical life at the University of Auckland."



Garry J. Tee

Centrefolds Index

BOOK REVIEWS

SPRINGER-VERLAG PUBLICATIONS

Information has been received about the following publications. Anyone interested in reviewing any of these books should contact

David Alcorn
Department of Mathematics
University of Auckland
(email: alcorn@math.auckland.ac.nz)

Alevras D, Linear optimization and extensions. (Universitext) 450pp.
Betounes D, Differential equations: Theory and applications. 740pp.
Blowey JF (ed), Theory and numerics of differential equations (Universitext) 280pp.
Chen H, Fundamentals of queuing networks. (Applications of Mathematics, 46) 405pp.
Cheney W, Analysis for applied mathematics. (Graduate Texts in Mathematics, 208) 450pp.
Cornil J-M, An introduction to Maple V. 470pp.
Davis MD, The math of money. 199pp.
Debarre O, Higher-dimensional algebraic geometry. (Universitext) 233pp.
Fabian M, Functional analysis and infinite-dimensional geometry. (CMS Books in Mathematics, 8) 451pp.
Gamelin TW, Complex analysis. (Undergraduate Texts in Mathematics) 478pp.
Greaves G, Sieves in number theory. (Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge, 43) 304pp.
Jensen A, Ripples in mathematics. the discrete wavelet transform. 246pp.
Johnson DL, Symmetries. (Springer Undergraduate Mathematics Series) 198pp.
Kane R, Reflection groups and invariant theory. (CMS Books in Mathematics, 5) 379pp.
Kiehl R, Weil conjectures, perverse sheaves and l'adic Fourier transform. (Ergebnisse der Mathematik und ihrer Grenzgebiete. 3. Folge, 42) 375pp.
Kinsey LC, Symmetry, shape and space. Introduction to geometry. 510pp.
Kushner HJ, Heavy traffic analysis of controlled and communication networks. (Applications of Mathematics, 47) 513pp.
Kushner HJ, Numerical methods for stochastic control problems in continuous time. (2nd ed) (Applications of Mathematics, 24) 475pp.
Lam T-Y, A first course in noncommutative rings. (2nd ed) (Graduate Texts in Mathematics, 131) 570pp.
Levin E, Orthogonal polynomials for exponential weights. (CMS Books in Mathematics, 4) 476pp.
Martin GE, Counting: The art of enumerative combinatorics. (Undergraduate Texts in Mathematics) 250pp.
Nedelec J-C, Acoustic and electromagnetic waves. (Applied Mathematical Sciences, 144) 316pp.
Newton PK, The N-vortex problem. (Applied Mathematical Sciences, 145) 415pp.
Pottmann H, Computational line geometry. (Mathematics and Visualization) 563pp.
Rudeanu S, Lattice functions and equations. (Discrete Mathematics and Theoretical Computer Science) 436pp.
Shubin MA, Pseudodifferential operators and spectral theory. (2nd ed) 288pp.

de Souza PN, Berkeley problems in mathematics. (2nd ed) (Problem Books in Mathematics) 535pp.
Spencer J, The strange logic of random graphs. (Algorithms and Combinatorics, 22 168pp.
Uchiyama A, Hardy spaces on the Euclidean space. (Springer Monographs in Mathematics) 305pp.
Wilson RJ, Stamping through mathematics. 133pp.
Winfree AT, The geometry of biological time. (2nd ed) (Interdisciplinary Applied Mathematics, 12) 777pp.
Yang Y, Solitons in field theory and nonlinear analysis. (Springer Monographs in Mathematics) 553pp.
Yor M, Exponential functions of Brownian motion and related processes. (Springer Finance) 203pp.

Basic Homological Algebra

by M. Scott Osborne, (Graduate Texts in Mathematics, 196),
Springer-Verlag, 2000, 365 pages, DM 98.00. ISBN 0-387-98934-X.

There have been quite a number of texts written on homological algebra, ranging from the rather forbidding *Homology* by S. Mac Lane through to the simplified approach of D. G. Northcott's *A first course in homological algebra* with, somewhere in between, P. J. Hilton and U. Stammbach's *A course in homological algebra*, Northcott's earlier text *Homological algebra*, J. P. Jans' *Rings and homology*, J. J. Rotman's *An introduction to homological algebra*, N. Bourbaki's *Algèbre homologique* and, more recently, C. A. Weibel's *An introduction to homological algebra*. Scott Osborne's text under review compares favourably with those on the middle ground and is recommended to anyone making a start on the subject, as well as a useful reference for standard material.

Osborne's presentation is often chatty and engaging. For example, on page 24, after proving the 5-Lemma, he encapsulates the argument by writing: "Whew! The above is an example of what is called a *diagram chase*, where maps are, well, chased around a diagram. It is a long and involved argument, but it is actually almost self-proving. Try it; cover, for example, the one-to-one part of the proof, and reconstruct it. At each stage, there is really only one thing to do." Another pleasing feature in the presentation is his copious use of diagrams---of course, these are indispensable in homological algebra, but, clearly helped by recent TeX packages, he puts them to good use much more than his predecessors.

The book starts with a surprisingly short chapter on categories, but then we find in the second chapter that most of the categories treated in the book will consist of modules over a ring. Indeed, the more general abelian category development is delayed until the 90-plus pages Chapter 7 and this chapter is not a prerequisite for the remaining two chapters (but is for the last two of four appendices). (Weibel's text on the other hand develops the general abelian category setup from its beginning.) In Chapters 2 to 6, we are introduced to the tensor product of modules, projective, injective and flat modules, complexes and resolutions, Ext and Tor, the various homological dimensions of a module and a ring and how these are affected by different ring constructions, and other derived functors. (By contrast, Northcott's *First course* and Jans omit the tensor product, and so flat modules and Tor.) Chapters 2 to 8 end with useful exercise sets.

So what's missing from Osborne? Well, firstly and not surprisingly, the not-so-easy topic of spectral sequences---for these see Mac Lane (but not in the first instance!), Rotman, or Weibel. He also doesn't touch on the homology or cohomology of groups or Lie algebras covered (to varying extents) in most of the other texts mentioned. On the other hand, his Chapters 8 and 9 present some material missing from the other treatments, in particular Lazard's Theorem (characterising flat modules as direct limits of free modules) and injective envelopes, while there is also a 14 page appendix on the "Jekyll-Hyde nature" of the ring of entire functions. Chapter 9 also looks at the Künneth Theorems.

In conclusion, Osborne's text is a useful addition to the literature which should appeal in particular to the beginner.

John Clark
University of Otago

The Heart of Mathematics: An invitation to effective thinking

by Edward B. Burger and Michael Starbird,
Textbooks in Mathematical Sciences, Key College Publishing in cooperation with
Springer-Verlag, 2000, 680 pages, DM 130.00. ISBN 1-55053-407-9.

This is a book that could be used either as a text for a course (what course comes later) or for individual study. It fits well into the difficult category of a mathematics prize for the upper levels of a secondary school.

The authors write in an easy style and are prepared to poke fun at themselves---there is a photograph of the first author with his feet tied together with a length of rope and his trousers down and preparing to turn them inside out. Referring to Eddington's statement on the probability of a band of monkeys typing Hamlet if given long enough the authors say "for this book only two monkeys were required". To illustrate expected value they carry out a comparison of expected gains for buying their book as against buying a lottery ticket. Naturally their book wins.

The first chapter is a collection of logical word puzzles, many of which I had met before, intended to promote logical

thinking. The authors follow the pattern of telling the stories en bloc, then giving some `nudges' before giving the solutions. I think I now understand the paradox about changing your choice in the story about the car behind one of three doors where the quizmaster opens one door after you state your choice and then invites you to change your mind. Then there is another batch of stories.

Chapter 2 looks at numbers, progressing from the integers, primes and Fibonacci numbers (from flowers and rabbits) to modular arithmetic, fractions and irrationals, including the intricacies of the decimal representation. On the way it explains the check digit systems of barcodes and other identification numbers, RSA codes and the usual proof of the irrationality of the square root of 2. The authors include some of the unsolved problems of number theory.

Infinity is the subject of the third chapter as the authors look at infinite sets and their different sizes. They spend time on examples of one-to-one correspondences, or lack of them, between finite sets and between infinite sets, showing that the rationals are countable but the reals are not. There are no more points in a square or the whole real line than there are in a short line segment. They also touch on the continuum hypothesis and use Cantor's Power Set Theorem to show that there is an infinity of infinities.

The fourth chapter is titled `Geometric Gems'. These gems include Pythagoras' theorem, the golden rectangle and tilings with congruent tiles or just a few polygonal shapes but arranged in a pattern which is scalable (similar to a subdivision of itself into smaller tiles of the same shapes) but never repeats, featuring the results of Berger, Penrose and Conway. After looking at the platonic solids and distances and angles on plane, sphere and saddle they discuss the curvature of space and move into the concepts of fourth and higher dimensions.

The fifth chapter `Contortions of space' is topological. Beginning with rubber sheet geometry it passes through the Moebius band and Klein bottle to consider the Euler characteristic and knots and fixed points. There is an error in their drawing---but not in the text, which is unspecific---on the result of turning a car tyre inside out. Their final drawing is the same shape of torus as their first one, but if you do this experiment you will find that the circumferences of the two `great' circles are interchanged and the inside-out tyre looks more like a double-walled cylinder.

In chapter six the authors consider chaos and fractals, illustrated with the Julia and Mandelbrot sets, their generation fully explained. There are also experiments on self-similarity that the reader can perform with a photocopier, making reductions of a picture and placing them in a certain pattern, reducing again and arranging the new copies in the same pattern and so on. The picture you end up with depends only on the pattern of placing the copies, not on the original picture. Discussion of the Koch curve and Sierpinski triangle, and related figures, leads to the concept of non-integral dimension.

The final chapter considers chance and risk, visiting probability, apparently amazing coincidences, expectations, `the average American' and data interpretation.

All this is well written and illustrated with generally good and relevant pictures. Everywhere the mathematics is motivated by good `real life' situations. As the topics listed indicate, the authors are not afraid to introduce ideas of some difficulty, but what they rigorously demonstrate is inevitably only a part of this. In line with their aim to encourage thinking, what can be proved by a verbal argument tends to be done, and what requires a computation tends to be left.

The book has a number of special features. There is a set of problems attached to each major section; the set as a whole is headed `MINDSCAPES Invitations to further thought' and is broken into four parts headed `Solidifying ideas', which consolidates the content of the section, `Creating new ideas' which extends the section but in a fairly simple way, `Further challenges' which extends the section further but gives less hint on how to proceed and `In your own words' which consists of four questions, always the same, an essay on the most interesting or surprising discovery in the section, a group discussion, an imaginative story and the collection of further real-life illustrations of the ideas.

The book's emphasis on thinking is not confined to chapter 1 but runs throughout. Every few pages there are general principles of thinking printed in blue. Here are a few: `Look at problems from different perspectives'; `If you have a hard problem, first work on a simpler related problem to develop insight'; `Don't ignore information'; `Understand simple things deeply'; `Ground your understanding in the specific'; `Consider the counterintuitive'; `Don't be afraid to make mistakes while creating new ideas'; `Coincidences are flashing lights alerting us to potential insights'. Such advice should be given explicitly to every mathematics student (and others), but too often we do not formulate it ourselves and so do not pass it on.

An innovative feature is `Surfing the book' an introductory chapter which gives you references direct to some of the most interesting pages throughout the book.

The book advertises that you can also get a box of extras with the book, but the publishers did not include this with the review copy. It seems to contain a CD-ROM, which among other things can be used to explore the Julia sets, red-green glasses for viewing some stereo pictures in the book, pieces from which objects or designs can be constructed and some special dice.

But these things are not essential to enjoyment of the book; you may well already have appropriate stereo-viewing glasses, and I did not find their 3-D pictures very convincing. The other objects could be made by the reader from the descriptions without too much effort.

The reader of this review can explore the book further via its webpage at www.heartofmath.com.

You can find out about the book, the box of extras, see the surfing pages, download some sample pages, read testimonials and reviews, even try out some of the activites on the CD-ROM. However, when I was there only a few of the activity links were operational.

Now, who is it for? It was written for the American Mathematics for Liberal Arts course. At Canterbury we don't have such a course, but this book could act as a powerful advocate for one. Too much of our students' mathematical experience is confined to the narrow progression of calculus and linear algebra. It is also good reading for any mathematics teacher, at any level. There will be bits of use in many courses, both in terms of actual content and as inspiration to adopt their approach and methods, trouser-dropping being optional.

David Robinson
University of Canterbury

Dynamical Systems, Ergodic Theory and Applications, 2nd ed.,
by L. A. Bunimovich, S. G. Dani, R. L. Dobrushin, M. V. Jakobson, I. P. Kornfeld,
N. B. Maslova, Ya. B. Pesin, Ya. G. Sinai, J. Smillie, Yu. M. Sukhov,
and A. M. Vershik, Encyclopaedia of Mathematical Sciences 100,
Springer-Verlag, Berlin, 2000, 459pp, DM 199.00. ISBN 3-540-66316-9.

Well I have long wanted to find the time to try my hand at book reviewing, having enjoyed the reviews in the Bulletin of the AMS, long, leisurely pieces that rehearse the whole history of a field and barely mention the book under review, Gian-Carlo Rota's pithier efforts ("When pygmies cast such long shadows, it must be very late in the day," ran one in its entirety; "On balance, useless" concluded another), not forgetting our own Vladimir Pestov's detailed reminiscences of a Russian boyhood. So, knowing something about dynamical systems and wishing to learn more about ergodic theory and yes, particularly wanting to use it for applications, I eagerly subscribed to this book.

But I'm afraid this isn't going to be the in-depth review I had hoped, because I just couldn't get into this book. Part of the problem is its structure: 5 parts, 13 chapters, each chapter written by a different subset of the 11 authors; there is no overall table of contents or introduction. I couldn't work out how the parts developed or were related to each other. Each part has its own bibliography, but some of the parts and even chapters have their own `additional bibliography' added for the new edition, the indexing schemes for all these being ambiguous. The index is very sparse so you can't find your way in from that route. Part of the problem is the style, which is very dense and formal, largely alternating definitions and theorems, with no proofs and little discussion. Even things I thought I knew something about are discussed in such a brief and context-free manner that I had trouble following them. It is hard to imagine which readers would benefit from a 2 page treatment of KAM theory, 3 pages on complex dynamics, or 6 pages on the renormalization theory of one-dimensional maps (the last not even using the term `renormalization' until an aside in the last line). The reader would have to be extremely well educated in many other branches of mathematics to begin with, and very alert and patient besides, to make much headway here.

To take just one example, I was puzzled by the statement of the Poincar\'e Recurrence Theorem, which here begins "Suppose (M,M,m) is a measure space, T : M ® M is its endomorphism" (which also gives you an idea of the quality of translation.) I thought the theorem was not true as stated, as it only holds in a *finite* measure space. The next theorem, the Birkhoff-Khinchin Ergodic Theorem, does begin, by contrast, "Suppose (M,M,m) is a space with normalized measure." Hindered by the inconsistent usage, it took me ages to unravel this and find in an aside, some pages earlier, that the authors define a measure space to be a normalized (i.e. finite with total measure 1) measurable space. OK, so this is a minor point, but with the bulk of the book I couldn't penetrate even this far.

On the other hand, it must be acknowledged that the book does covers a lot of ground. There are chapters on ergodic theory, spectral theory, entropy theory, general group actions, trajectory theory, smooth hyperbolic dynamical systems, billiards, one-dimensional mappings, dynamical systems on homogeneous spaces, and statistical mechanics. The difficult material on general group actions (in which the `time' variable is replaced by groups other than ℝ or ℤ) and on homogeneous spaces was new to me---these have become major fields in their own right, linking diverse branches of mathematics, e.g. Lie and finite group theory and number theory, for which Margulis won the Fields medal in 1978.

I presume that one idea of the Encyclopedia of Mathematical Sciences was to allow top Russian mathematicians to present summaries of their fields, hence the compact style and lack of proofs. Indeed, when the first volumes started appearing the 1980s they did well, providing a parallel view of the evolution of, say, dynamical systems, many valuable references to the Russian literature, and had the advantage of being brief. Now, with 102 volumes at last count, the whole thing seems to have gotten out of hand. In my opinion they don't even function well as an encyclopedia because there is no overall consistency, coverage, or indexing. Notwithstanding these reservations, there is still a huge amount of material summarized here for experts by many of the great leaders of this field.

Robert McLachlan
Massey University

Metric Spaces of Non-positive Curvature
by M. Bridson and A. Haefliger, Grundlehren der mathematischen Wissenschaften, 319,
Springer-Verlag, Berlin, 2000, 643pp, DM 169.00. ISBN 3-540-64324-9.

This book is encyclopedic in its content, and anyone interested in the geometry of negatively curved spaces and their applications will be well served by it.

One of the major achievements of 19th century mathematicians was the discovery that the canonical geometries of 2 dimensional spaces are negatively curved. In fact the Koebe-Klein-Riemann uniformisation theorem says that, apart from a few obvious exceptions, every 2 dimensional surface admits a metric of constant negative curvature. Indeed even reasonable singular space (orbifolds) admit such structures. In the late 1970's and early 80's Thurston announced his uniformisation program which conjectures a similar result in 3 dimensions. Roughly every 3 manifold (or orbifold) can be cut up in a canonical way (along certain spheres and tori) so that the remaining pieces admit a geometric structure; the canonical such structure is that of constant negative curvature. While the conjecture is not fully established, there has been considerable progress towards it solution (it is known when the manifold is Haken and in the orbifold case).

In the 1950's Alexandrov introduced the notion of nonpositive curvature for metric spaces generalising the notion of Riemannian curvature for manifolds (different than that developed by Busemann). Here the basic objects are metric spaces in which every pair of points can be joined by a geodesic (an arc isometric to a closed interval) and for which every triangle satisfies a certain inequality (dubbed the CAT(0) or CAT(k) condition by Gromov, C=Cartan, A=Alexandrov, T=Toponogov). These inequalities are motivated by the comparison theorems of Riemannian geometry. One compares the angles and the length of sides of a triangle in the given metric space with those of a similar triangle in a space of constant curvature k. The reader will immediately grasp the connection with Gromov's theory of hyperbolic groups where the Cayley graph of a groups satifies a CAT(-1) type property, and indeed it was a series of lectures in the early 1980's by Gromov which inspired many of the developments discussed in this book. Indeed the Gromov/Thurston program has provided a huge impetus to the study of negatively curved spaces and it is impossible to overestimate the effect it has had on modern topology and geometry.

To the book at hand. Well it's long (620 pages of text), but it is well written. The arguments for the most part are elementary and build from earlier chapters. It is well set out and structured. There are 3 parts to the book. The first is an introduction to geodesic metric spaces. This part (150 pages) serves as a basic introduction to themes that run through the book. Some highly nontrivial stuff is obtained by the end of this "introduction" such as a discussion of the quasi-isometric classification of groups and spaces and its relation to the growth of groups. The second part of the book (234 pages) concerns CAT(k) spaces. It discusses their various characterisations and properties. Principal among these is the local to global property given by the Cartan-Hadamard theorem. One first meets this result in any course on Riemannian geometry. The point is that the curvature bounds are a local (in fact infinitesimal) property of a space, but they imply global geometric properties (eg. local convexity to global convexity of the universal cover space, implying such things as the uniqueness of geodesics.) Then the classification of the isometries of such spaces is given and the very useful Fat Torus Theorem is proved. After this there is a nice section on (classical) Symmetric spaces providing some direction and motivation for subsequent constructions and results.

Up to this point there is not a lot that is really new, though there are novel and innovative approaches given. The well known book of Ballman, Gromov and Schroeder (Manifolds of nonpositive curvature) covers a lot of similar material and has the same themes, but in not nearly the same generality. The increased generality is important, since oftentimes one wishes to apply the theory to more general spaces than manifolds, e.g. Bruhat-Tits buildings, graphs and complexes.

I spent most of my time reading the third part of the book. Here the full force of the theory is brought to bear on important and interesting problems such as the algorithmic theory of negatively curved groups (solutions to word problems, residual finiteness decompositions and so forth). The second section of the third part consists of a presentation of the second author's work on complexes of groups (used to describe the action of a group on a simplicial complex in terms of local data on the orbit space) generalising the classical Bass-Serre theory. The last part of the book concerns developability theory with the main aim of establishing that certain (complete Hausdorff) connected groupoids of local isometries are developable.

The book is a bit tough at the end, but the journey there is quite appealing. The first author gave a series of lectures based on an early draft of this book at the NZMRI conference run in Tologa Bay several years back. Those lectures gave everyone a gist of the subject. Here is the full blown theory. It is a book well worth having!

Gaven Martin
University of Auckland

Ausstellungskatalog "Kühler Abschied von Europa"
- Wien 1938 und der Exodus der Mathematik.

by Karl Sigmund, Arkadenhof der Universität Wien. 17. September - 20. Oktober 2001.
Österreichische Mathematische Gesellschaft (128 pages).

As part of the International Congress of Mathematicians at Berlin in 1998, the German Mathematical Society (DMV) staged an Exhibition "Terror and Exile", in which it honoured and documented 53 Berlin mathematicians who had suffered under the Nazi Regime, amongst them Bernhard Neumann who was present as special guest of the Berlin Senate and the DMV. This event was the impetus for the Austrian Mathematical Society (ÖMG) to hold a similar exhibition at the Universität Wien (17/9/2001---20/10/2001), focusing on the events in Vienna. In the preface to this Catalogue it is mentioned that this is intended as but a first stage towards a more complete treatment of the topic.

It is impossible to do justice to the subject matter in the framework of 128 pages A5, but considering this limitation, Karl Sigmund (President ÖMG, 1997-2001) has succeeded admirably in conveying the human tragedies and triumphs that marked that era.

The booklet is structured as a mixture of essays on individuals (Karl Menger and the seminar of mathematics at the University of Vienna, Kurt Gödel, Eduard Helly, Alfred Tauber's path to Theresienstadt), some sections grouping short biographies under a common theme (Mathematics and philosophy in Vienna, Pillars of the mathematical colloquium, Displaced Viennese mathematicians, Technical University, Viennese mathematicians in Berlin, Mathematics and literature, Born in Vienna; the section `Party members' lists Theodor Vahlen, Karl Mayerhofer and Anton Huber) and a couple of sections summarising the major developments of the time (Vienna 1938, Expulsion of Jewish students). Significantly, there is a good number of reproductions of items from the exhibition: portraits, documents and pictures of locations.

As I read the text, I could not help but be impressed by the atmosphere of an immensely fertile cultural milieu in the Vienna of the 1930's, giving an entirely different dimension to our cliche of `cafe society'. Particularly interesting are the links between literature and mathematics. But altogether this is an account of a dark period in history; the following quote (in section 2) from Walter Rudin's book **So hab ich's erlebt** offers a positive note, without removing the sadness:

> "In one respect we were better off than the German Jews. In Germany they tightened the screws only slowly. (...) Consequently, many German Jews hesitated until it was too late. In Austria it was clear within days that there was no alternative to leaving the country. (...) I never returned."

I conclude by noting that the catalogue has a few New Zealand connections: Karl Popper and Hans Offenberger feature in the biographical sections, and Garry Tee is acknowledged amongst the people who assisted in the project.

Paul Hafner
Unversity of Auckland

The Geometry of Spacetime
by James J. Callahan, Undergraduate Texts in Mathematics
Springer-Verlag, Berlin, 1999, 320pp, DM 98.00. ISBN 0-387-98641-3.

I am going to give this book two reviews, one from my point of view and one from the author's.

First from my point of view.
When I offered to review this book I thought, at last, here is what I have been looking for---a book by a *mathematician* in the Springer Undergraduate Texts in Mathematics Series which will do for the General Theory what I did in my book "The Special Theory of Relativity for Mathematics Students" [5], put it in a proper *mathematical* setting. It comes after a number of historical books I have in my possession [1,2,4,6,7] and I expected a modern approach.

No such luck. Here is an author who has apparently never heard of a *vector space* or a *manifold*!! (Even the concept of *set* is used sparingly.) Well, not quite. In Chapter 1 he talks about linear maps $\mathbb{R}^2$® $\mathbb{R}^2$ without mentioning what the terms *linear* and $\mathbb{R}^2$ actually mean. If you care to do the exercises though you will find out as a sort of afterthought what linear means in this 2-D case. It is typical of the sloppiness of the book that he doesn't distinguish between the set $\mathbb{R}^2$, the plane $\mathbb{R}^2$ and the vector space $\mathbb{R}^2$. And later he uses the concept of basis without mentioning what it is.

The whole book takes place in some vague 4-dimensional space in which coordinates are given to space and time in a way that is not in the least clear. It seems to me, following Weyl [p219] that the appropriate model is a 4-dimensional manifold which has metric of the familiar (1,1,1,-1) type. The tangent spaces will be Lorentz spaces.

I doubt his wisdom in taking the speed of light as 1 and using hyperbolic sines and cosines in his interpretation of the Lorentz equations. While it brings a beautiful correlation with the Euclidean case it obscures the central position played by the speed of light in the theory, a point he acknowledges on page 105. In addition while he uses the usual

inner product for 2-vectors to derive the matrices for rotations and reflections, surprisingly he doesn't use an inner product for Minkowski space to deduce the Lorentz equations preferring to jump straight to the norm.

But worse is to come---tensors. Here is the definition:

> **Definition 6.2** *A **tensor of type** (p,q) denoted by*
>
> $$\begin{matrix} G_{i_1 \cdots i_p} \\ T_{j_1 \cdots j_q} \end{matrix} \quad \longleftrightarrow \quad \begin{matrix} R_{k_1 \cdots k_p} \\ T_{l_1 \cdots l_q} \end{matrix}$$
>
> *is a multi-index quantity defined in each coordinate system that transforms according to the rule*
>
> $$\begin{matrix} R_{k_1 \cdots k_p} \\ T_{l_1 \cdots l_q} \end{matrix} = \begin{matrix} G_{i_1 \cdots i_p} \\ T_{j_1 \cdots j_q} \end{matrix} \frac{\partial x^{k_1}}{\partial \xi^{i_1}} \cdots \frac{\partial x^{k_p}}{\partial \xi^{i_p}} \frac{\partial \xi^{j_1}}{\partial x^{l_1}} \cdots \frac{\partial \xi^{j_q}}{\partial x^{l_q}}$$
>
> *This tensor is **contravariant of rank** p and **covariant of rank** q. Tensors of type (1,0) and (0,1) are called vectors.*
>
> We say that a multi-index quantity is **tensorial** if it transforms by this rule. The pattern is simple: For each covariant index, multiply by a copy of the same matrix that transforms bases; for each contravariant index, multiply by a copy of the inverse matrix.

What does it mean?
Actually the answer is found in Einstein [4]. "the things hereafter called tensors are further characterized by the fact the the equations of transformation for their components are linear and homogeneous". According to Weyl ([7] page 37) a tensor "defines uniquely a linear algebraic form ...".

One place where the nature of a tensor is spelt out clearly is [3] where it is made clear that tensors exist in direct sums of the tangent space and its dual.

In my opinion here is the way it should be done. Start with the 4-D vector space V of tangent vectors at a point in a manifold. Choose a Minkowski basis for it, say e_1, e_2, e_3, e_4. The contravariant tensors are the members of a vector space $V \otimes V$ having as basis the 16 symbols of the form $e_i \otimes e_j$. Any tensor can be written in the form $a^{ij} e_i \otimes e_j$ (with the usual summation convention) and then by suppressing the basis vectors as a^{ij}. What happens when the basis is changed to f_1, f_2, f_3, f_4? Suppose that $e_i = b_i^k f_k$. Then $e_i \otimes e_j = b_i^k f_k \otimes b_j^l f_k = b_i^k b_j^l f_k \otimes f_l$. This can be written in terms of coordinates as follows: $a^{ij} e_i \otimes e_j = a^{ij} b_i^k b_j^l f_l = c^{kl} f_k \otimes f_l$, where $c^{kl} = a^{ij} b_i^k b_j^l$. Finally in terms of coordinates in the form beloved by applied mathematicians and physicists, $x^i e_i = x^i b_i^k f_k = x'^k f_k$, where $x'^k = x^i b_i^k$, from which it follows that $b_i^k = \partial x'^k / \partial x^i$, the expression given by Einstein. He can perhaps be forgiven that working in the 1920's but why stick to that inadequate approach in a book for undergraduates who would certainly have done a course on linear algebra beforehand. It could be justified if the x' varied non-linearly with the x but that is not the case, at least according to the great man himself.

Covariant tensors are formed from the dual space using the dual basis e^i and mixed tensors come from using both.

Why is this a superior way to approach tensors? The answer is that it is concrete and deals with equalities of tensors and does not depend on some sort of handwaving over expressions. It removes the vagueness of the old-fashioned approach.

Typical of the muddle the author gets into is this simple case:

> ***Proposition 6.5*** *A function $\phi \longleftrightarrow f$ defined consistently in each co-ordinate frame is a tensor of type (0,0).*
>
> **Proof:** At the outset we know that f is a function of $x'^k = x^i b_i^k$ and ϕ is a function of ξ^i. For these to be "defined consistently", $f(x^k(\xi^i)) = \phi(\xi^i)$. This is the transformation law; it involves no matrices because f and ϕ have no indices.

What does this equation mean? There is an index k on the left which has disappeared on the right. What has happened to it? And what does "defined consistently" actually mean?

Next, the Principles of Relativity. He introduces them almost casually but I believe they should be shouted from the roof tops. After all they are what the book is about. And they do play a central role in the theory.

Overall I am reminded of a story once told to me by a mathematics teacher when I was at school. When a pupil

asked "What is Pythagoras' theorem?" he replied "The square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides". When asked what that meant he replied "That is another story". Well, I would like to have been more informed on the other story.

My second review: from the author's viewpoint i.e. given the fact that he was not writing for me and I am able to fill in the gaps what sort of a job does he do?

The answer is a very good one. He gives a very full account at all times, including enough detail to convince the reader of the verity of his mathematics.

He begins with a full and clear account of the situation before Einstein, involving classical space-time, the Michelson-Morley experiment, Fitzgerald contraction, Maxwell's equations and the Lorentz transformation.

In Chapter 2 he treats the Kinematics of Special Relativity, that part of the theory which doesn't take force or mass into account, deriving the Lorentz equations from the invariance of the light cone, i.e. (1,1) and (1, -1) are eigenvectors. (You see how taking the speed of light as 1 obscures the central role played by it in the theory.) The he goes on to their interpretation in terms of hyperbolic sines and cosines. Finally he derives the traditional formulae for measurements of length and so on.

Chapter 3 is on what he calls the Kinetics of Special Relativity, which he says is the study of the motion of material objects under the action of forces. He begins with Newton's Laws of Motion leading up to conservation of 4-momentum. On pages 99 and 100 he invites us to consider a head-on collision of two trucks. He calculates the total energy before and after the collisions and invites us to believe that the kinetic energy of the trucks has been converted into the mass of the trucks: in other words their rest mass after the collision is greater than it was before!! I don't think so. Where has the extra kinetic energy gone to? Well, from bitter experience I think it went into noise, the crumpling the fronts of the trucks and then to heat. Then on page 102 he springs a new notation on us without explanation: Dx/Dt. I think he just means dX/dt, but I suppose I could be wrong.

In Chapter 4 he gets down to business: Arbitrary Frames, for example latitude and longitude. (This appears to be an unhappy diversion as they do not form an inertial frame.) What happens under uniform rotation, linear acceleration, leading up to the statement of the Equivalence Principle. Then Newtonian gravity and in the last section gravity in special relativity under which he investigates the gravitational red shift and the bending of light rays. In this context he states the Principle of General Relativity, which seems a strange place for it. And after all this he comes to the conclusion that Special Relativity is inadequate to describe gravity.

Chapter 5 (Surfaces and Curvature) begins with a conventional description of the differential geometry of surfaces with the surface of a sphere used as a detailed example of the theory. then, by analogy, he treats de Sitter space-time making it very clear. Next, the classic theory of surfaces and curvature.

Chapter 6 (Intrinsic Geometry). Gauss's Theorema Egregium is there under the heading **The Theorem**. The first and second fundamental forms. Here he defines the Christoffel symbols of the first and second kind and the mixed and covariant Riemann curvature and Ricci tensors. How much easier it would be to see what is going on if he had a more concrete definition of tensor. Then to the crucial idea of a geodesic. Section 6.3 on Curved Spacetime begins "we shall define a curved spacetime to be a portion of $\mathbb{R}^4$ etc. despite the lesson he learned from Gauss that that is definitely not what it is!!! This coming straight after a section on Intrinsic Geometry. The section ends with the introduction of the tangent space, as a afterthought. Then, as an example of all that has gone before, a nice exploration of the hyperbolic plane. The next section is on Mappings. Finally the tangent space comes into its own, differentials and their properties. Then at last: **Basic assumption:** All laws of Special Relativity hold in the tangent space. Section 6.5 on tensors has already been mentioned.

Finally Chapter 7: General Relativity. He quotes Einstein "the general laws of nature are to be expressed by equations which hold good for all systems of co-ordinates, that is, are covariant with respect to any substitutions whatever" [p117]. What did Einstein mean by "all systems of co-ordinates"? Surely he meant ones that depend on a Lorentz basis in the tangent space. Or, as Einstein puts it "for infinitely small four-dimensional regions the theory of relativity in the restricted sense is appropriate, if the co-ordinates are suitably chosen" [p118]. Anyway he puts up convincing arguments to describe a gravitational field in terms of geodesics. Then a seven page detailed and worthwhile account of what happens in a constant gravitational field, computations complicated enough to which I respond---phew, what would it all look like in a more complicated situation!! Then an account of the tidal effect in Newtonian physics and a full account of it in general relativity in terms of the separation of geodesics. Fermi co-ordinates and their significance; the vacuum field equations in terms of the Ricci tensor; the matter field equations; what happens in the presence of matter, the energy-momentum tensor and the relativistic equations of the gravitational field.

Chapter 8 (Consequences) is naturally the most interesting in the book. It begins with the Newtonian theory as an approximation in a weak gravitational field with velocities small in comparison to the speed of light. After pointing out that the gravitational field equations are in general intractable he looks at one case when they can be solved, the

case of a massive body situated at a point and the Schwarzschild metric for a spherically symmetric distribution of mass. And lastly to the successes of the general theory. The bending of light in a gravitational field had already been predicted in the special theory but the general theory gives a better explanation of it. The perihelion drift of the planets: the Newtonian theory gives the orbits as ellipses, but it was known that the axes of the planet Mercury were rotating. The general theory explained this accurately.

So in conclusion, from one point of view an unacceptable book but from another, a very good one. And maybe there is still room for a book "The General Theory of Relativity for Mathematics Students"!!!!

References

[1] Born, Max, *The Restless Universe*, Dover, 1951.
[2] Born, Max, *Einstein's Theory of Relativity*, Dover, 1962.
[3] Crampin, N and Pirani, F.A.E., *Applicable Differential Geometry*, London Mathematical Society Lecture Note Series, 59, Cambridge University Press, 1986.
[4] Einstein, Albert, *The Foundations of the General Theory of Relativity. The Principle of Relativity*, Dover, 1923, pp109-164.
[5] Lorimer, Peter, *The Special Theory of Relativity for Mathematics Students*, World Scientific, 1990.
[6] Reichenbach, Hans, *Space and Time*, Dover, 1958.
[7] Weyl, Hermann, *Space, Time, Matter*, Dover, 1950.

Peter Lorimer
University of Auckland

CONFERENCES

International Conference on
Formal Power Series and Algebraic Combinatorics

FPSAC 2002

July 8 -- 12, 2002

The University of Melbourne (Australia)

First announcement -- Call for papers

Topics
All aspects of combinatorics and their relationship with other parts of mathematics, computer science and physics.

Conference program
Invited lectures, contributed presentations, poster session, problem session and software demonstrations.

Official languages
The official languages of the conference are English and French.

Invited Speakers
The list of invited speakers is not complete yet. However, the following scientists have already accepted to give an invited talk at FPSAC 2002: Hélène Barcelo (USA), Alan D. Sokal (USA), Philippe Di Francesco (France), Christian Krattenthaler (Austria), Thomas Prellberg (Germany), Peter Forrester (Australia), Brendan McKay (Australia), Jan de Gier (Australia), Ole Warnaar (Australia).

Call for papers and posters
Authors are invited to submit **either** extended abstracts of at most twe lve pages, or full articles of at most twenty-five pages by *December 15, 2001*.

Note that this constitutes an extension of the system used at previous conferences. The idea is that those who wish to submit full articles will only have to undergo one cycle of refereeing. Their papers will appear both in the conference proceedings and in the subsequent published journal volume. If extended abstracts are submitted, they will, as previously, be refereed for the conference. Subsequently, authors will be invited to submit full articles of the extended abstracts for journal publication. These will then be refereed by the relevant journal.

The aim of the current proposal is to simplify matters for those ready to submit a full article. Please indicate, on your submission, whether it is an extended abstract or a full article.

To submit your papers, preferably use the submission server of the conference, which is available through the Internet at the URL http://www.fpsac.ms.unimelb.edu.au/. If you are unable to use the web for submission, please email fpsac-submission@ms.unimelb.edu.au for further instructions.

The submitted papers should begin with a summary written in English and French (translations will be provided if necessary). Authors should indicate the mode of presentation which they consider appropriate for their paper, i.e. lecture or poster session. Notification of acceptance or rejection is scheduled for late February 2002.

Open problem session
Contributions to the problem session are invited in advance of the conference dates. People interested in submitting a problem should submit it as described above, before *June 1, 2002*.

Software demonstrations
Demonstrations of software relevant to the topics of the conference are encouraged. People interested in giving a software demonstration should submit before *February 15, 2002* a paper including the hardware requirements, as described above.

Program committee

Susumu Ariki (Tokyo)	Gilbert Labelle (UQAM)
Sara Billey (MIT)	Jean-Christian Novelli (Lille)
Maylis Delest (France)	Renzo Pinzani (Florence)
Art Duval (Texas-El Paso)	Andrew Rechnitzer (Toronto \& Melbourne)
Omar Foda (Melbourne, *Co-Chair*}	Frank Sottile (Mass.)
Sergey Fomin (Michigan)	Itaru Terada (Tokyo)
Vesselin Gasharov (Cornell)	Jean-Yves Thibon (Marne-la-Vallée)
Anthony Guttmann (Melbourne, *Co-Chair*}	Dominic Welsh (Oxford)
Angele Hamel (Waterloo)	Trevor Welsh (Melbourne)
Ron King (Southampton)	Nicholas Wormald (Melbourne)

Participant support
We have applied for grants to provide partial support of participants---in particular of students and junior scientists. The success or otherwise of these grant applications will be posted on our website as soon as they become available. If the applications are successful, requests for such support should contain a letter of recommendation and include the estimated transportation and living expenses for the duration of the conference as well as the amount of any support available from other sources. All requests should be sent *in duplicate by January 15, 2002* to the following address:

Prof. Anthony Guttmann, FPSAC 2002,
Department of Mathematics and Statistics, The University of Melbourne,
VIC. 3010, AUSTRALIA.

Location
The conference will take place on the campus of the University of Melbourne, located in Parkville, Melbourne, Australia. The first talk is scheduled for *July 8, 2002* at 9:00 a.m.

Accommodation
On-campus single accommodation with shared bathroom and laundry facilities is available at $55 AUD per night. A choice of standard hotel accommodation, most within easy walking distance of the campus, can be found on the conference website.

Further information
All important information concerning FPSAC 2002 can be found on the conference web site available through the Internet at the http address http://www.fpsac.ms.unimelb.edu.au/. More details will be given in future announcements. For any further question, write to fpsac@ms.unimelb.edu.au.

Organising committee
Nantel Bergeron (York), Richard Brak (Melbourne), Catherine Greenhill (Melbourne), Anthony Guttmann (Melbourne, *Chair*, and Aleks Owczarek (Melbourne).

Registration
Until *April 1, 2002*, the regular registration fee is $440 AUD. A reduced fee of $220 AUD is offered for students. These fees will respectively be $660 AUD and $330 AUD in case of payment after April 1, 2002.

REPORT ON THE 2001 NEW ZEALAND MATHEMATICS COLLOQUIUM

The 2001 New Zealand Mathematics Colloquium was held at Massey University at Palmerston North during the period 3-6 December, with a welcoming reception held at Colombo Hall on the evening of the 3rd.

There were six invited speakers in total giving talks in a wide range of areas of mathematics:

Douglas Bridges (University of Canterbury), "Mathematics with a different logic".
Robert McLachlan (Massey University), "Geometry and numerical analysis".
John Rayner (University of Wollongong), "Lessons from a quarter of a century of research".
Hyam Rubinstein (University of Melbourne, NZMS speaker), "Algorithms for surfaces in 3-dimensional manifolds".
Mike Steel (University of Canterbury), "Five characteristics of any current species suffice to determine their history"
Antoinette Tordesillas (University of Melbourne, ANZIAM Speaker), "The fifth state of matter".

There were a total of 81 registrants including 23 students and the six invited speakers. The number of contributed talks was 60 including 17 student talks. All these students entered for the Aitken prize. This year's winner was Brian van Dam of the University of Auckland. Highly recommended were Nicolette Moir, Will Wright, (University of Auckland), Patrick Rynhart and Shona Yu (Massey University).

In a special session Mike Hendy spoke about the "Outline of proposal for a Centre of Research Excellence: The New Zealand Institute of Mathematics and its Applications".

A Forum on Maths Curriculum was held on Wednesday afternoon. The speakers were Glenda Anthony, Bill Barton, Jim Neyland, Peter Rawlins and Geoff White.

As in 2000, the Colloquium Business Meeting was held before the NZMS AGM as a separate session. It was agreed that the next Colloquium will be hosted by the University of Auckland. The 2003 Colloquium will be held in Sydney as part of ANZ/ICIAM.

There were two excursions on the Tuesday afternoon. 19 hardy souls did the Manawatu Gorge Walkway in an easy 4 hours, and 13 others eventually made it to the Tararua Wind Farm. They all rounded it off with a great country dinner watching the cows and rain from the verandah in true kiwi fashion.

Mathematics books from Pearson Education New Zealand were on display from Monday morning through to Thursday morning.

Overall the Colloquium was a success. We wish to thank the following sponsors: ANZIAM for supporting the ANZIAM Speaker (Antoinette Tordesillas), the New Zealand Mathematical Society for providing financial support not only to the NZMS Speaker (Hyam Rubinstein), but also to enable students to attend the Colloquium and Hoare Research Ltd who made contributions towards the cost of the Colloquium.

Our thanks also to the Chairs of the sessions who contributed to the smooth running of the Colloquium. Last, but not least, we are also grateful to the postgraduate students from the Dept of Mathematics who helped us with the tasks that were important for the overall running of the Colloquium. These included helping out at the registration desk, transporting people, packing the satchels, etc.

Marijcke Vlieg-Hulstman

Conferences in 2002

February 11--15 (Adelaide) **Mathematics in Industry Study Group 2002**
website: www.unisa.edu.au/misg/

March 18--20 (Bangkok) **International Conference on Algebra and its Applications**
email: math@chula.ac.th
website: http://math.nie.edu.sg/earcome/

May 27--31 (Singapore) **ICMI-EARCOME 2002 SEACME 9 "Mathematics Education for a Knowledge-Based Era"**
email: ctmapl@singnet.com.sg
website: http://math.nie.edu.sg/earcome/

July 7--12 (Sydney) Algorithmic Number Theory Symposium V
email: ants5@maths.usyd.edu.au
website: http://www.maths.usyd.edu.au:8000/u/ants5/

MINUTES

Minutes of the 27th Annual General Meeting
5:00 pm, Wednesday 5 December 2001
Massey University

Present. R. Downey (Chair), D. Alcorn, I. Boglaev, J. Butcher, M. Carter, R. Chan, N. Cloete, P. Fenton, D. Gauld, W. Halford, J. Harper, S. Hendy, J. Hudson, S. Joe, A. Korobeinikov, R. McKibbin, R. McLachlan, A. McNaughton, R. Murray, K. Pledger, M. Roberts, C. Semple, P. Senarath, J. Sneyd, G. Thornley, G. Weir. \vspace{-0.5mm} \noindent {\bf
Apologies. B. Barton, D. Bridges, M. Hendy, G. Wake.

1. **Minutes of 26th Annual General Meeting**
   It was moved (Harper and Butcher) that the minutes of the 26th Annual General Meeting of the NZMS be accepted. The motion was carried.
2. **Matters arising from the minutes** (numbers refer to items of the 26th Annual General Meeting).
   11 Dr Stephen Joe has made available a "list of visitors to New Zealand" on the NZMS web page.
   There were no other matters arising.
3. **President's report**.
   a. In the absence of Prof. Graeme Wake, the President's report was delivered to the meeting by Prof. Rod Downey. It will appear in the NZMS Newsletter.
   b. It was moved from the Chair that the report be accepted. The motion was carried.
   c. As noted in the report, the terms of office of Prof. Douglas Bridges and Dr Stephen Joe have ended. The membership thanked them for their work on Council.
4. **Treasurer's report.**
   a. The Treasurer's report was delivered to the meeting and the financial statements were distributed to the members.
   b. It was moved (Murray and Sneyd) that the statements be accepted. The motion was carried.
   c. Dr Rua Murray outlined what had been discussed at the Council Meeting held earlier in the day.
      i. The books *Modelling* and *Mathematics with Statistics* will be written off and distributed to low-decile schools.
      ii. The NZMS will grant the 2001 Colloquium $1500 for the NZMS Lecturer and $1000 for student support.
      iii. The NZMS will adopt an investment strategy as outlined in 3. of the Treasurer's Report. Some issues raised from the floor were the following: concerns with the reduced capital; and to consult with a financial advisor.
   d. It was moved (Murray and McLachlan) that there be an increase in NZMS subscription rates as follows: $34 + GST for ordinary members (currently $32 + GST) and $7.20 + GST for students (currently $6.40 + GST). The motion was carried.
   e. It was moved from the chair that the NZMS set up a student travel fund that would eventually become an endowment fund for student travel, prizes, and scholarships. Furthermore, in conjunction with this motion the NZMS would apply for donee status so that donations to this fund would be tax deductible. The motion was carried.
5. **Membership Secretary's report and annual subscriptions.**
   A report from the Membership Secretary, Dr John Shanks, was tabled. It was moved from the Chair that the report be accepted. The motion was carried. It was raised (Prof. John Harper) that supervisors should encourage their students to become members and that the list of Fellows of the NZMS appear on the NZMS web page. Dr Stephen Joe will make sure that the latter happens.
6. **Election of Incoming President and two Council members.**
   a. The terms of office of Prof. Douglas Bridges and Dr Stephen Joe have now ended. This has resulted in two vacancies on Council.
   b. Nominations received at closing date: Dr Shaun Hendy (Industrial Research Limited) and Prof. Geoff Whittle (Victoria University of Wellington).
   c. Dr Shaun Hendy and Prof. Geoff Whittle were unopposed and thus duly elected to the NZMS Council.
   d. The members thanked Prof. Douglas Bridges and Dr Stephen Joe for their contributions during their time on Council.
7. **Appointment of auditors.**
   It was moved (Murray and Semple) that the current auditors, McKenzie McPhail (4th floor, Farmers Mutual House, 68 The Square, Palmerston North), be reappointed for another year. The motion was carried.
8. **New Zealand Journal of Mathematics.**
   a. David Alcorn delivered a report to the meeting with the amendment that the special issue marking Prof. John Butcher's retirement was edited by Dr Robert Chan.
   b. It was moved from the Chair that the report be received. The motion was carried.
9. **NZMS Visiting Lecturer 2002.**
   To mark 25 years since the first NZMS Visiting Lecturer, there will be two lecturers for 2002.
   a. Prof. John Butcher (University of Auckland).
   b. Dr James Geelen (University of Waterloo).
10. **Forder Lecturer 2003.**
    a. Prof. Caroline Series is the Forder Lecturer for 2003. As yet, no coordinator has been appointed for

her visit.
   b. Prof. Rod Downey is to seek further funding from the British Council.
11. **General Business**.
   a. Prof. Rod Downey raised the possibility of the NZMS writing on-line texts to build capital and to keep costs down for students. The brief discussion that followed was positive.
   b. The members thanked Prof. Graeme Wake, the outgoing President, for his contributions as President over the last two years.

The meeting closed at 6:35 pm.

Minutes of the 44th Council Meeting
12:00 pm Wednesday 5 December 2001
Room ScB2.09, Massey University

Present: Rod Downey (Chair), Douglas Bridges, Peter Fenton, Stephen Joe, Robert McLachlan, Rua Murray, Charles Semple, Hyam Rubinstein (Australian Mathematical Society observer)
Apologies. Bill Barton, Graeme Wake.

1. **Minutes of 43rd Council Meeting.**
   It was moved (Joe and McLachlan) that the minutes of the 43rd Council Meeting of the NZMS be accepted. The motion was carried.
2. **Matters arising from the minutes** (numbers refer to items of the 43rd Council Meeting).
   2 Still no reply from the President of the Korean Mathematical Society regarding the NZMS joining the the Asian Mathematical Union.
   13(c) Dr Stephen Joe has made available a "list of visitors to New Zealand" on the NZMS web page.
3. **Formal ratification of earlier decisions made by e-mail.**
   It was moved (Semple and Downey) that the following decisions by e-mail be ratified (Council Meeting July 2001).
   a. Grants of $400 made to the following applicants: Michelle Dalrymple, Nicolette Moir, Greg Oates, Gabriela Popa, Luminita Vita, Will Wright.
   b. A decision on NZMS investments be deferred until we meet in person at this year's formal Council Meeting in December 2001
   c. The NZMS will give $1000 towards the production costs of the New Zealand Journal of Mathematics. This allocation is for the 2001/2002 year.

   The motion was carried.
4. **President's report, Treasurer's report, and Membership Secretary's report**. All three reports were tabled.
   a. It was moved (Murray and Semple) that the $1000 grant for 2001/2002 to the New Zealand Journal of Mathematics include any arrears. The motion was carried.
   b. It was moved (Murray and Semple) that *Modelling* and *Mathematics with Statistics* be written off and distributed to low-decile schools. The motion was carried.
   c. It was moved from the Chair that the 2001 Colloquium be granted $1500 for the NZMS Lecturer and $1000 for student support. The motion was carried.
   d. It was recommended (Murray and Downey) that there be an increase in NZMS subscription rates as follows: $34 + GST for ordinary members (currently $32 + GST) and $7.20 + GST for students (currently $6.40 + GST).
   e. It was moved (Murray and McLachlan) that the NZMS adopt an investment strategy as outlined in 3. of the Treasurer's Report. The motion was carried.
5. **Requests for financial assistance.**
   The applications for financial assistance were considered. After some discussion, the following grants were approved.

   Rick Beatson and Shayne Waldron (conference) $400
   Derek Holton and Ivan Reilly (conference) $400
   David Gauld (conference) $400
   Padmanathan Kathirgamanathan $500
   Dillon Mayhew $500

   While supporting conferences organised by members and hosted in New Zealand is important, the Council is limited to the extent to which the NZMS can give support. As such, the Council intends to review the application process relating to this matter.
6. **Nominations for two Council positions.**
   a. The terms of office of Prof. Douglas Bridges and Dr Stephen Joe have ended.
   b. Nominations received at closing date: Dr Shaun Hendy and Prof. Geoff Whittle.
7. **NZMS Visiting Lecturer 2002.**
   To mark 25 years since the first NZMS Visiting Lecturer, there will be two lecturers for 2002.
   a. Prof. John Butcher (University of Auckland)
   b. Dr James Geelen (University of Waterloo)

8. **Forder Lecturer 2003.**
    a. Prof. Caroline Series is the Forder Lecturer for 2003. As yet, no coordinator has been appointed for her visit.
    b. It was noted that establishing future support from the British Council may be difficult.
9. **NZMS Research Award 2001**
    a. The NZMS Research Award 2001 will be announced at the Colloquium Dinner (Wednesday 5 December 2001).
    b. It was noted that the judging panel for 2001 consisted of Assoc. Prof. Mike Steel (convenor), Dr Graham Weir, and Prof. Rod Downey.
10. **Aitken judging panel.**
    This year's Aitken Prize judging panel is Prof. David Gauld (convener), Assoc. Prof. Peter Fenton, Dr Mick Roberts, and Dr Gillian Thornley.
11. **General Business.**
    a. Prof. Graeme Wake raised the issue of student funding for the 6th Australian/New Zealand Mathematics Convention to be held in Sydney in 2003 as part of the 5th International Convention for Industrial and Applied Mathematics (ICIAM). We hope to commit a total of $10,000 for this fund including the cost of the NZMS Lecturer. This commitment is dependent on a motion being put at the Colloquium Business Meeting (Wednesday 5th December 2001).
    b. Assoc. Prof. Peter Fenton and Prof. Derek Holton raised the issue that the annual amount set aside for financial assistance be increased. As much as the Council would like to do this, it was pointed out by Dr Rua Murray that it is financially constrained to do so. However, this will be discussed further at a later date.
    c. Contacted by the current President of the Israeli Mathematical Society, Dr Vladimir Pestov raised the possibility of joint meetings with the Israeli Mathematical Society. It is expected that such meetings would be held in New Zealand. Prof. Rod Downey would follow this up.
    d. Dr Bill Barton wondered if the NZMS would like to be more involved in the development of the national mathematics curriculum. A discussion meeting relating to this matter is taking place at the Colloquium (Wednesday 5th December 2001). Prof. Rod Downey will follow this further with Prof. Geoff Whittle.
    e. Prof. Rod Downey raised the possibility of the NZMS writing on-line texts to build capital and to keep costs down for students. Prof. Rod Downey, Assoc. Prof. Peter Fenton, and Prof. Geoff Whittle will investigate this further.
    f. Assoc. Prof. Robert McLachlan discussed the possibility of the NZMS producing a book outlining careers in mathematics. If produced, it would be sold at cost to departments. Prof. Hyam Rubinstein pointed out that the Australian Mathematical Society had a job website for employees looking for mathematicians.
    g. Assoc. Prof. Robert McLachlan raised the issue of establishing an endowment for student prizes, scholarships, and travel. Initially it would be set up as a travel fund. This will be discussed at the AGM.
    h. Dr Stephen Joe will continue as webmaster of the NZMS website.

The meeting closed at 2:00 pm.

Minutes of the 2000 New Zealand Mathematics Colloquium (NZMC) Business Meeting
This meeting was held in SG.01 at the University of Waikato on November 27th, 2000, 5:30pm

Present. K Broughan (Chair), D Alcorn, I Boglaev, J Butcher, M Carter, R Downey, D~Gauld, R Goldblatt, W Halford, J~Harper, J~Hudson, J~Hunter, S~Joe, E~Kalnins, G.~Liddell, C~Little, M~McGuinness, D~McIntyre, R~McKibbin, R~McLachlan, A~McNaughton, R.~Murray, V~Pestov, K~Pledger, M~Roberts, C~Semple, G~Tee, F~Thompson, G~Thornley, G~Wake.

1. **Apologies:** Bill Barton, Marston Conder.
   A few moment's silence was observed in memory of Dr Bruce Robson.
2. It was moved (McKibbon and Halford) that the minutes of the 1999 Colloquium Business Meeting be accepted. Carried.
   Matters arising from the minutes Further discussion of last year's motion that {\sl the NZMC annual general meeting be disbanded and incorporated into the NZMS AGM as of 2000} took place. It was agreed that for 2001, the two meetings be held together, but that the finances of the Colloquium should remain separate from those of the Society. No motion is recorded.
3. Graeme Wake reported that the 1999 Colloquium made a $676 profit, and that a float of $10,444.05 was forwarded to the 2000 committee. It was moved (Murray) that the financial report be accepted. Carried.
4. The NZMC2000 organizing committee reported that the 2000 Colloquium had received 109 registrations, including 39 students. A total of 7 invited talks, and 62 contributed talks were expected, with 23 students entered as candidates for the Aitken prize. ANZIAM had contributed $400, and the NZMS was expected to contribute $2500 to the running costs of the Colloquium. Waikato's VC (Prof. Bryan Gould) had also given $1000. Approximately $2500 of financial support was allocated to student participants. The committee expected a loss of less than $1000.
5. It was agreed that the 2001 Colloquium be held at Massey (PN), with Dec 3-5 as preliminary dates. A large

number of participants at this year's Colloquium meant that four parallel sessions had been necessary, with talks limited to 20 minutes + 5 minutes for questions and movement between sessions. Additionally, several local participants had withdrawn their talks to avoid scheduling problems. It was agreed in discussion that a 25 + 5 minute format should be allowed for in 2001, with the number of parallel session limited to three. If necessary, the Colloquium should be extended to include a fourth day.
The 2002 Colloquium will be hosted by Otago.
After discussion it was agreed that the 2003 Colloquium be held in Sydney, as a satellite meeting of ICIAM. It was noted that this will make the Colloquium much more expensive to attend than is usual, and that NZMS may consider providing additional financial support for participants travelling to Sydney in 2003

6. The possibility of adding "interest group sessions" or pre-imposed mini-symposia to the scientific programme of future Colloquia was discussed. The meeting agreed that the present broad focus of the Colloquium was desirable, and should continue.
7. There was no General Business.

Rua Murray
Secretary, NZMC2000 Organizing Committee

NOTICES

NZMS RESEARCH AWARD

This annual award was instituted in 1990 to foster mathematical research in New Zealand and to recognise excellence in research carried out by New Zealand mathematicians.

The NZ Mathematical Society Research Award for 2001 was recently made at the 2001 Mathematics Colloquium to Warren Moors (University of Waikato) "for his impressive body of interconnected research work on the geometry and topology of Banach spaces, related questions of set-theoretic topology, and especially non-smooth analysis and optimization, where a number of deep insights of a foundational nature have been achieved."

Other recipients to date have been John Butcher and Rob Goldblatt (1991), Rod Downey and Vernon Squire (1992), Marston Conder (1993), Gaven Martin (1994), Vladimir Pestov and Neil Watson (1995), Mavina Vamanamurthy and Geoff Whittle (1996), Peter Lorimer (1997), Jianbei An (1998), Mike Steel (1999), and Graham Weir (2000).

Call for nominations 2001/2002 Applications and nominations are invited for the NZMS Research Award for 2002. This award will be based on mathematical research published in books or recognised journals within the last five calendar years: 1997-2001. Candidates must have been residents of New Zealand for the last three years.

Nominations and applications should include the following:

1. Name and affiliation of candidate.
2. Statement of general area of research.
3. Names of two persons willing to act as referees.
4. A list of books and/or research articles published within the last five calendar years: 1997-2001.
5. Two copies of each of the five most significant publications selected from the list above.
6. A clear statement of how much of any joint work is due to the candidate.

A judging panel of three persons shall be appointed by the NZMS Council in advance of the receipt of nominations. The judges may call for reports from the nominated referees and/or obtain whatever additional referee reports they feel necessary. The judges may recommend one or more persons for the award, or that no award be made. No person shall receive the award more than once. The award consists of a certificate including an appropriate citation of the awardee's work, and will be presented (if at all possible) around the time of the AGM of the Society in 2002.

All nominations (which no longer need to include the written consent of the candidate) and applications should be sent by 31 March 2002 to the NZMS President, Rod Downey, at the following address:

Professor Rod Downey
School of Mathematical and Computing Sciences
Victoria University
P0 Box 600
Wellington, New Zealand

Please consider nominating any of your colleagues whose recent research contributions you feel deserve recognition!

GRANTEE REPORTS

Michelle Dalrymple, University of Canterbury

16th International Workshop on Statistical Modelling, New Trends in Statistical Modelling, Odense, Denmark, 2--6

July 2001
Unfortunately, due to lack of funding, I was unable to attend this workshop. My supervisor, Dr Irene Hudson, presented my first refereed conference paper entitled "Survival, block bootstrap and mixture methods for detecting change points in discrete time series data with application to SIDS". The presentation was well received.

Collaborative Research, Professor Malcolm Faddy, University of Birmingham, 6--8 July 2001
Discussion continued on a planned collaborative journal article, working title being "Extended Poisson processes, ZIP and hurdle models with application to sudden infant death syndrome". Interpretations and justification of methods and results were debated and further analysis initiated.

27th Conference on Stochastic Processes and their Applications, Cambridge, United Kingdom, 9--13 July 2001
The talks given in this conference were mainly concentrating on theoretical aspects of stochastic processes. Dr Hudson and I gave a joint talk in the only applications stream. The session was well attended, and our work well received.

Collaborative Research, Andrea Le Fevre, Scottish Agricultural College, 14--16 2001
Ms Le Fevre and I had some interesting discussions on the similarities of general linear mixed models when applied to two diverse areas: cow-hoof disease and SIDS.

Tutorials on Mixture Modelling, Hamburg, Germany, 23 July 2001
The tutorials by Dankmar Böhning on "Mixture Models: Computational Aspects and Applications" and Bruce Lindsay on "Mixture Models: Model Structures and Inferential Methods" consolidated my knowledge of mixtures and highlighted areas for further work.

Recent Developments in Mixture Modelling, Hamburg, Germany, 23--28 July 2001
This conference was the largest ever gathering of mixture specialists and enthusiasts with nearly 160 participants from all over the world.

There was a good combination of invited and contributed sessions, with those more experienced happily sharing their knowledge.

My presentation titled "Truncated, Zero-Inflated and Classical Poisson Mixture Analysis: Investigating Differential Covariate Effects on SIDS" went well. I received positive response. Prof. Murray Aitkin made a good suggestion that will be followed up.

As well as generating new ideas and methodologies, the conference had a very friendly environment, and gave me an opportunity to make international contacts. The combination of Professors, Doctors and fellow PhD students was refreshing and enjoyable.

I thank the NZMS for their financial contribution which helped make my trip successful.

Nicolette Moir, University of Auckland

Thanks in part to a grant from the New Zealand Mathematical Society, I was able to take part in the SciCADE 2001 conference (Scientific Computing and Differential Equations). This was held at the Coast Plaza Hotel in Vancouver, Canada from 29 July to 3 August 2001. The SciCADE series of conferences were initiated at The University of Auckland in 1993 and have been held at two yearly intervals since, in a different country each time. They are by far the most important series of conferences in the area of the numerical solution of differential equations. This year there were approximately 200 participants. There were four parallel sessions, plenary talks and a poster session.

I was given the opportunity to present a talk but decided to present a poster instead. I have presented talks at several other conferences and wanted the opportunity of presenting my work in a different format. The title of my poster was "Fourth order ARK methods with five stages". ARK methods are a specific class of methods for numerically solving ordinary differential equations; my thesis topic is the analysis and implementation of these novel methods. There were 18 contributed posters, with ample time allowed for participants to view these posters and ask questions. I found this more rewarding than a talk as there was more interaction with the other participants. I had many people asking me about the details of my work. I handed out some working notes to those that were interested. This gave a more detailed discussion of my results than I was able to include in my poster. These were very popular and I have had several people e-mail me about them subsequent to the conference.

For me, one of the highlights of the conference was a mini-symposium entitled "ODE problem solving environments". There are three major computer problem solving environments used in computational mathematics. These are Matlab, Mathematica and Maple. Representatives from each of the companies that develop these applications presented a paper in this mini-symposium. Researchers in computational mathematics use Matlab and either Mathematica or Maple as their two main research tools, so it was very good to get a behind-the-scenes look at the new developments in these applications.

Another highlight for me was a short course that was offered on Geometric Integration. This was presented by

Professor Chris Budd from the University of Bath. Although this is not directly related to my research area, it is certainly relevant to it. Furthermore, the research group I am in has started to explore this topic. It was very helpful to have an overview of the subject presented by an expert.

I found the conference to be interesting and informative. It gave me the chance to reestablish contacts made at previous conferences, as well as to establish new ones. I have been asked to give seminars at two universities in England when I visit there next (which I hope to do next year sometime). These are Cambridge University and the University of Bath.

An additional benefit, for me, at this conference was that I was able to see what new advances had been made in the area of mathematical software. This was particularly beneficial as there are very few formal publications in this area. The outcome of research efforts are not usually papers, but computer codes. Most of the information is passed along by word of mouth, I was able to talk to the people that write these codes about my methods and get feedback on them.

I am very grateful for this grant, which has helped enable me to attend this conference and present my work in an international setting.

Greg Oates, University of Auckland

With the generous support of New Zealand Mathematical Society, the Research Committee and the Department of Mathematics of the University of Auckland, I was recently able to attend the WARTHOG DELTA '01 Conference, held in Kruger National Park, South Africa in July this year. The conference was the Third Southern Hemisphere Symposium on Undergraduate Mathematics Teaching, a biennial event that has gained a reputation as a premier forum for practitioners and researchers in the field of undergraduate mathematics. The conference attracted some 108 delegates, predominantly from Australia, New Zealand, South Africa and its neighbouring countries, with some notable representation also from the UK and the USA. There were five keynote speakers who gave a range of stimulating addresses, including Alan Schoenfeld from the University of California, who questioned whether we are preparing our students to become flexible and resourceful mathematical thinkers, and Matthias Kawski from Arizona State University, who discussed the role of visualisation in advanced mathematics courses. Verdiana Grace Masanja from the University of Dar es Salaam addressed the future role of mathematics in guiding innovations in mathematics education, John Mason from the Open University, UK, discussed the structures of attention and intention in teaching and learning mathematics, and Cyril Julie from the University of the Western Cape finished off the keynote addresses by looking at an activity system of school teaching mathematics and mathematical modelling.

The venue for this conference was surely one of the most naturally stunning locations in which to hold any conference. Game drives were incorporated into the conference programme, and the natural beauty of Kruger National Park with so many animals to view in their natural surroundings provided an unforgettable back-drop to the conference proceedings.

I attended the conference under three guises. Firstly, I presented the initial paper arising from my Ph.D. research into the role of technology and its effect on mathematics curriculae. This study has a primary focus on the calculus curriculum in first year undergraduate courses and the paper, co-written with Mike Thomas, was entitled Throwing Out the Bath Water? Adapting Curricula to Reflect Changes in Technology. Late in 2000, a committee established to review the core courses made the decision that the use of super calculators (CAS) will be phased in gradually in all stage one mathematics' courses at The University of Auckland. The ability of such calculators to make many of the tasks previously examined in these courses trivial has meant that a comprehensive curriculum revision is now needed. The paper presented progress to date in the curriculum review process addressing such questions as "Which topics will need to be taught/examined differently; what material can/should we discard; what new topics may be taught?" Discussion generated from the presentation of the paper has given me much insight into future directions for my research, and established some valuable contacts for further discussion and possible collaboration in this newly emerging field of research.

Secondly, I co-authored a paper, presented at the conference by Ivan Reilly, entitled A Course for Student Tutors. This paper describes the experience of the University of Auckland's mathematics department in developing and delivering a course designed to meet the annual challenge of finding and training a cohort of effective tutors for first year classes. The department offers for academic credit to senior undergraduate students a course called Tutoring in Mathematics. The course provides tutors to a stage one bridging calculus course at the University and it is hoped that students taking the course will

1. consolidate their own understanding of basic mathematical concepts and techniques;
2. gain theoretical and practical knowledge about both the learning and teaching of mathematics;
3. gain personal satisfaction from using their own knowledge to help other students;
4. gain sufficient experience to assess their own attitudes to, and suitability for, teaching as a career (without having to make a major commitment in that direction).

The paper discusses such things as the history, the curriculum, the practicum, some of the outcomes, and the future of the Tutoring in Mathematics course.

The third guise under which I attended the conference was in my capacity as a member of the organising committee for the next conference, the fourth Southern Hemisphere Symposium on Undergraduate Mathematics Teaching to be held in Queenstown, November 22 - 27, 2003. It is hoped that a large number of our mathematics teaching colleagues from New Zealand tertiary institutions will be attracted to attend this forum, and some of the advance planning was undertaken at the conference in South Africa. One innovation arising from this year's conference was the publication of the conference proceedings in a special supplement of the Journal of the South African Mathematical Society, Quaestoniones Matematicae. It is hoped that we may be able to continue this process by publishing the proceedings of the Queenstown conference in a special supplement of NZJMS.

I felt very privileged to be able to attend this conference and present and discuss my work in such a distinguished forum. I wish to sincerely thank the NZMS for the financial support provided to help me attend this conference, and acknowledge the vital and continuing support of such bodies as the NZMS, and individual University mathematics departments and research funds which provide many graduate students with similar opportunities.

Gabriela Popa, University of Canterbury

I would like to let you know about the two conferences which I attended, to give you a brief idea about how things were going there. The facts that I consider that should be reported concerning these conferences are as follows:

The third Discrete Mathematics and Theoretical Computer Science conference (DMTCS'01) was organised by the Centre for Discrete Mathematics and Theoretical Computer Science of the University of Auckland (Conference Chair Professor C.S.Calude, University of Auckland) and took place at the Faculty of Mathematics and Computer Science "Ovidius" University, Constanta, Romania, from the 2nd to the 6th of July, 2001.

Constanta is a beautiful city at the board of the Black Sea with plenty of history, traditions and arhitecture.

Big names in the field were there like F. Harary, H. Ishihara, P. Odifreddi, I. Tomescu.

New Zealand was represented by Douglas Bridges (University of Canterbury), Cristian Calude (University of Auckland), Elena Calude (Massey University), Luminita Simona Vîta (University of Canterbury).

I gave a talk entitled "Approximate Minima, Epigraphs and Sections of Functions in Constructive Mathematics" (joint research with D.S.Bridges).

The third Panhellenic Logic Symposium was held at the Anogia Academic Center, Anogia Village, Crete, Greece, July 17-22, 2001.

Anogia was an ancient village where people were pretty hospitable and made nice hand crafts.

Big names were there too like Peter Clote, Joan Rand Moschovakis, Danielle Mundici, Rohit Parikh.

At this Symposium New Zealand was represented by D.S.Bridges (University of Canterbury) and Luminita Simona Vîta (University of Canterbury).

I gave a talk entitled "Approximating Equilibria and Pareto Optima".

Both conferences were productive because I had the chance to see many presentations in different styles and to become familiar with some of the latest research.

I am most grateful to The New Zealand Mathematical Society for providing support that made my participation in these meetings possible.

Luminita Vîta, University of Canterbury

I wish to thank the Mathematical Society for their financial contribution towards my expenses in attending the Third International Conference "Discrete Mathematics and Theoretical Computer Science" DMTCS01. The meeting was dedicated to Professor Frank Harary on the occasion of his 80th Birthday, and took place at the Faculty of Mathematics and Computer Science of the OVIDIUS University Constanta, Romania, from July 2 to July 6, 2001. The conference was organized jointly by the Centre for Discrete Mathematics and Theoretical Computer Science Auckland, and OVIDIUS University Constanta, with the co-operation of the Maritime Academy Mircea cel Batrân, Constanta, Romania.

The conference encompassed all areas of discrete mathematics and theoretical computer science. Topics of interest included the following:

- abstract data types and specifications
- algorithms and data structures
- automata and formal languages

- computability, complexity and constructive mathematics
- computational algebra, biology, geometry and number theory
- concurrency, distributed systems and parallel computing
- discrete mathematics, combinatorial computing and category theory
- formal semantics, specification, synthesis and verification
- logic, nonmonotonic logic and hybrid systems.

The DMTCS'2001 proceedings has been published by Springer Verlag, London, in the DMTCS Series, and was made available during the conference. Abstracts of poster talks are located in CDMTCS Research Report 152,

http://www.cs.auckland.ac.nz/CDMTCS/

There were four invited speakers: F. Harary (New Mexico, State University, USA), H. Ishihara (Jaist, Japan), P. Odifreddi (Turin University, Italy), I. Tomescu (Bucharest University, Romania). Another 30 participants, from overseas (four from New Zealand) as well as from Romania, also presented talks. There were four presented talks (including mine) and one invited talk on constructive mathematics, the field I am working on.

The social programme included an opening gathering followed by dinner, a half day trip around the beautiful county of Dobrogea, conference dinner and a half day cruise on the Black Sea.

I am pleased to report that the conference was a real benefit for me, enabling me to meet new people as well as old friends. I also take this opportunity to thank the main organizer, Professor Cristian S. Calude from the University of Auckland, for the excellent conference.

Will Wright, University of Auckland

The grant from the New Zealand Mathematical Society allowed me the opportunity to attend several conferences while overseas, from the beginning of June until the end of August. The first conference I attended was the 19th Biennial Conference on Numerical Analysis, held at the University of Dundee, Scotland during 26-29th of June. The second conference was SciCADE 2001, (Scientific Computing and Differential Equations). This was held at the Coast Plaza Hotel in Vancouver, Canada from the 29th July to 3rd of August. The last conference, or rather workshop, was entitled Dynamics of Numerics and was held at the Fields Institute at the University of Toronto, Canada from the 6-9th August.

I presented talks at the first two conferences attended and had many interesting discussions with people as a result. I was invited by Dr Adrian Hill to visit him at the University of Bath, shortly after the first conference, to discuss my work with him.

The main attraction of any conference is see what new and interesting things people are working on. This experience has given me many ideas of what I would like to work on in the future and I am grateful for this grant which made this possible.

Dillon Mayhew, Victoria University

Earlier this year I attended the 26th Australasia Conference on Combinatorial Mathematics and Combinatorial Computing. The conference was held at the Curtin University of Technology in Perth from the 9th to the 13th of July.

I had never before visited Western Australia, so this was a chance to explore a new city, always an exciting experience. In this case it was especially enjoyable. Perth is a great city. It has a cosmopolitan energy and a busy night-life; a large block of the central city is almost entirely devoted to restaurants serving a variety of cheap and tasty food. Cultural attractions were also notable; the Museum of Western Australia happened to be featuring a retrospective on the life of Albert Einstein, and also boasted some interesting permanent displays, including one of the world's largest collections of meteorites. Of course the week was made even more pleasant by the fact that it was a chance to escape from a wet and blustery Wellington winter and enjoy some very clement Australian weather.

The conference was attended by 52 participants, for the main part Australian, but there were representatives from New Zealand, America, China, Japan and Canada. Victoria University was represented by Steven Archer, Petr Hlineny and myself. The majority of the talks were centered around graph theory, with complexity theory and design theory making up most of the remainder. I was one of two people presenting a talk on matroid theory, Petr being the other.

The conference excursion took us to the historic port of Fremantle, worth visiting for the fascinating Maritime Museum alone, and to two of the well-known local vineyards. The dinner was held at a restaurant on the banks of the Swan river, where we could enjoy views of the city along with our swordfish steak.

My own talk was on finite upper bounds for the number of inequivalent representations of certain matroids. The Combinatorial Mathematics Society of Australasia was nice enough to give me their student prize for my

presentation, so that was an pleasing and surprising conclusion to the conference.

All in all, a most enjoyable week, and my thanks go to the New Zealand Mathematical Society for their financial support.

Warren Moors, University of Waikato

In January and February of 2001 Petar S. Kenderov from the Bulgarian Academy of Sciences visited Warren Moors at the University of Waikato. The visit which was partially supported ($500) by the NZMS has led to some progress on the question of which compact spaces have the Namioka property. During his visit Petar attended the Devonport Topology Festival (in Auckland) and presented a seminar on "Well-posedness of optimization problems" at the University of Waikato.

MARSTON ↦ MARSDEN

The Minister of Research, Science and Technology, Hon. Pete Hodgson, has announced the appointments to the Marsden Fund Council, formerly called the Marsden Fund Committee, to recognise the important role it plays within New Zealand's innovation system. The Chair of the Marsden Fund Committee, Professor Diana Hill, from the University of Otago, has been reappointed as Chair of the new Council. The other members of the Marsden Fund Council are the Deputy Chair, Dr Garth Carnaby (WRONZ), Dr Ian Ferguson (HortResearch), Professor Robert Ballagh (University of Otago), Professor Marston Conder (University of Auckland), Mr Jonathan Mane-Wheoki (University of Canterbury), Dr David Wratt (NIWA), Professor Sally Casswell (University of Auckland), and Professor Pat Sullivan (Massey University).

DAVID CRIGHTON MEMORIAL CONCERT

(Michael McIntyre (Professor of Atmospheric Dynamics at Cambridge and a graduate of the University of Canterbury) has submitted the following item as many New Zealanders knew David Crighton well.)

Classical music lovers and admirers of David Crighton may have heard about the remarkable charity concert held in David's memory last May, organized by Johanna Crighton. The excitement and atmosphere were captured in a professionally-produced recording, now available. The 2-CD set can now be obtained at the bargain-basement price of just L10, plus L1 for postage & packing. Solve some of your Christmas present problems and support a worthy cause! Audio clips from the recording (mp3) and more information about the charities and the music are available at the website www.atm.damtp.cam.ac.uk/people/ mem/crighton.html. Orders may be placed with Mrs Rita Gaggs, 2 St Marks Court, Barton Road, Cambridge CB3 9LE, UK, +44-1223-565913 (messages may be left on answerphone), or email oliver.gaggs@geo2.poptel.org.uk. Cheques in UKL, please, to either of two charities: "David Crighton Music Fund" if you'd prefer to support young musicians, or "University of Cambridge (David Crighton Fund)" if you'd prefer to support mathematical research. The programme consisted of three glorious piano trios, passionately performed by three artists who knew David personally: Haydn's Trio in A major (1785), Hob. XV:9, the great Schubert in B flat major (1825-7), D 898, and the mighty Dvorak in F minor (1883), Op. 65-plus an encore given after nearly two-and-a-half minutes of applause at the end---the deeply-felt third movement of Schumann's Marchenerzahlungen Op. 132-all of it great music resonating with David's life in many ways, speaking of joy in the face of adversity, of his love of his fellow humans, and of his radiant optimism for the future.

GEOFF WHITTLE FRSNZ

Geoffrey Peter Whittle, Reader in Mathematics at Victoria University of Wellington, was elected as new Fellow of the Royal Society of New Zealand at the Academy Council Annual General Meeting on \linebreak 15 November 2001. The citation reads:

"Dr Whittle has carried out work in discrete mathematics and combinatorics, and in particular, in the study of matroids, which ranks at the very highest level in that field internationally. Matroids are combinatoric structures that abstract the notion of a finite configuration of points in a vector space. Dr Whittle has made one of the half dozen most significant contributions in the history of matroid representation theory, the remainder having been made by some of the world's best combinatorial mathematicians. In the last eight years he as been at the forefront of developments in this area, in the process solving problems previously considered impossible, and, as a consequence, revitalising the field of matroid theory.'

MANDELBROT FILM

A few days ago, an Australian film "The Bank" was premiered at Melbourne Film Festival, and then it was screened at Auckland Film Festival on Saturday July 21. The hero is a young mathematician, who applies fractal theory to predict the stock market. He is employed by a bank director, played by Anthony la Paglia as an utterly loathesome character. (Indeed, la Paglia could be superb in the role of Richard Nixon: he even looks the part!).

The film skilfully suggests the mathematical and computing work by the hero, with the Mandelbrot set being employed very effectively, in the credit titles and in the computer action sequences. The climactic scene, where

poetic justice is dealt to the bank director, brought delighted applause from the Festival audience.

I recommend you to watch out for "The Bank", and see it if you can.

The 2001 Forder Lecturer Tom Körner will give a lecture about Brownian motion, from Pollen to the Stock Market, in Room 222 on Thursday July 26, at 3pm.

Garry Tee

NZJM EDITOR'S REPORT NOVEMBER 2001

During the last year two issues have appeared:

Volume 29 number 2, October 2000: & 12 papers, 140 pages
Volume 30 number 1, April 2001: & 12 papers, 101 pages

The October issue (v30 no2) will be distributed shortly. Vol. 29 no2 was a special issue edited by Robert Chan marking John Butcher's retirement.

There are currently 20 papers which have been accepted for publication while a further 29 papers are being refereed. The Journal continues to maintain a high standard with only about one quarter of those papers submitted being accepted for publication. In the current issue (v30 no2) five of the ten papers have New Zealand authors but this is not typical. The Journal would welcome more submissions from New Zealand institutions, especially those outside Auckland.

Support from the Society in terms of individual subscriptions continues to be strong and the continuing direct grants from the Society play an important role in helping to keep the Journal financially viable. We would also like to acknowledge the substantial ongoing support from the Department of Mathematics of the University of Auckland.

The day to day running of the journal continues in the able hands of Joel Schiff (Executive Editor) and Jianbei An (Associate Editor). They have been assisted by Min-Young Lee on the editorial side while Betty Fong continues to play a vital role on the production side.

Gaven Martin

MATHEMATICAL VISITORS TO NEW ZEALAND

The NZMS web page on visitors to New Zealand has been resurrected by our web master Stephen Joe. Anyone who anticipates having a visitor is urged to contribute this information using the on-line form at

http://www.math.waikato.ac.nz/NZMS/visitors.html

Local correspondents should also endeavour to help keep the list up to date.

BIOMATHEMATICS UNDERGRADUATE DEGREE APPROVED

Massey University has just been given CUAP approval to launch New Zealand's first undergraduate degree major in BioMathematics. This programme, which will enroll its first students in February 2002, will be introduced initially at Massey's Palmerston North campus. The major can be undertaken as either a BSc or BInfSc degree, as a 24 paper 3 year degree programme. The course will be a coordinated package of existing papers from both the biological and mathematical sciences, including papers such as BioInformatics, Biological Evolution, DNA Technology, Differential Equations and Mathematical Modelling.

This course has been planned by Professors Mike Hendy (Mathematical Biology) and David Penny (Theoretical Biology), to produce graduates who have a strong foundation in both the mathematical and biological sciences. Under previous regulations, it had been difficult for the majoring mathematics student to study a significant coordinated minor in biology, and vice versa, because of prerequisite and timetabling constraints. As Biology has become more focused on the quantitative and information sciences, there has been a growing demand for graduates with expertise from these diverse fields. Now, with access to the rapidly growing genomic databases, this country will need many new graduates to support the growth of New Zealand's Biotechnology Industries, and to interpret and exploit this biological knowledge tsunami.

Professor Hendy spent 11 months of 2000, teaching into, and cooperating in the development of a similar course at the University of Greifswald, the first Biomathematics undergraduate programme in Germany. The Greifswald course, which was launched in 1998, has been very popular with German students. It was the basis for structuring the Massey course, which incorporates many of the principles developed in Germany.

A student completing the Biomathematics major at Massey will be only one paper short of a mathematics major (and

this can be taken as an elective), so will essentially be a mathematician with a strong foundation in Biology, who will be able to communicate easily in a biological environment. Although bioinformatics is included in the major, the graduate will also have the skills to handle the more traditional mathematical biological topics, which often involve mathematical modelling and differential equations.

A fourth year honours degree programme is being planned to follow on from the undergraduate degree. These will complement the already successful existing graduate training (MSc and PhD) at Palmerston North, which has been producing researchers in this field for over 10 years.

Mike Hendy

MATHEMATICAL MINIATURE 16

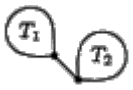
Mike Hendy on Catalan Numbers and Evolutionary Trees

S_0	S_1	S_2	S_3	S_4	S_5 ⋯
1	1	2	3	5	8 ⋯
2	4	6	10	16	26 ⋯
4	7	11	18	29	47 ⋯

Mike Hendy of Massey University, Palmerston North, recently reminded me that we each solved the same problem brought to New Zealand by a visiting mathematician, Kenneth Stolarsky. Consider the table on the right, where each element in S_1 is the lowest positive integer which has not appeared in a previous row of $S_1 \cup S_2 \cup S_3 \cup S_4 \cup \cdots$, and each element in S_2 is formed by multiplying the S_1 element on the same row by the ``Golden Ratio" $\frac{1}{2}(1+\sqrt{5})$ and finding the closest integer. The elements in S_3, S_4 etc are formed using the Fibonacci difference equation $u_n = u_{n-1} + u_{n-2}$. The elements in S_0 are the differences of those in S_1 and S_2. Prove that every positive integer occurs once and only once in $S_1 \cup S_2 \cup S_3 \cup S_4 \cup \cdots$, and that $S_0 = S_1 \cup S_2$.

Mike has sent me the following dissertation on Catalan Numbers and Evolutionary Trees. I am using this unchanged except that I have replaced his figures written in LaTeX picture environment by my own versions written using the package PSTricks because I think this package should be better known. This is where you take over, Mike.

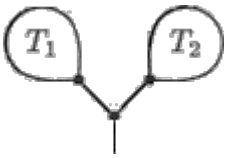
In his most recent visit to New Zealand, Douglas Rogers spent five days in Palmerston North. At my invitation he delivered three guest lectures on Generating Functions to my Honours Course in Discrete Mathematics. The first talk concerned pictorial derivations of generating functions, illustrated by an application of Catalan numbers. Amongst other things, the Catalan number c_n is the number of rooted planar trees with n edges. (The reader may be familiar with the number of legal bracket pairs such as occur when discussing associativity, where c_n is the number of different pairings that can be made in a product of n symbols.)



Douglas' pictorial derivation of the recurrence relation was based on the diagram at the right. For $n = 0$ edges, there is just the trivial tree of one vertex, so $c_0 = 1$. For $n > 0$ let T_1 and T_2 be the subtrees incident to the leftmost edge from the root. If T_1 has k edges, then T_2 has $n - k - 1$ edges. Thus $c_n = \sum_k c_k c_{n-k-1} \quad (n \geq 1; c_0 = 1)$.

(If we use the device of setting $c_n = 0$, for all negative n, then we do not need to set limits to this sum.) Hence the ordinary generating function $C(x) = \sum_n c_n x^n$ satisfies the equation $C(x) = 1 + xC^2(x)$. (1)

This presentation reminded me of my construction of a generating function for the sequence b_n of rooted binary evolutionary trees labelled by [n] = {1,2,...,n}. (These are rooted trees, with the leaves labelled by [n], and the other (internal) vertices are each of degree 3. I will refer to these here as n-trees.) It is easily seen that $b_1 = 1$ counts the tree of one edge, which joins the root to the leaf 1. We find each (n+1)-tree can be obtained from an n-tree T, by joining a leaf labelled $n + 1$ to an edge of T. This construction increases the number of edges by 2 and internal vertices by 1. Hence each n-tree has 2n-1 edges and n-1 internal vertices, giving the recursion $b_{n+1} = (2n-1)b_n$, ($n \geq 1$; $b_1 = 1$.) Thus we have the well known result that $b_n = (2n - 3)!!$, the product of the first n - 1 odd positive integers.

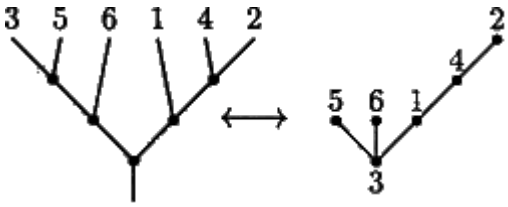


However I wanted to illustrate generating functions to my class. For $n > 1$, an n-tree T can be decomposed into two subtrees, a k-tree T_1 (labelled by $S \subset [n]$ of order k), and an (n - k)-tree T_2 (labelled by [n] \ S of order n - k) by deleting the root. When we sum over all such pairs of complementary trees and over all $\binom{n}{k}$ labelling subsets S, we count each pairing twice (the trees are not embedded in the plane, so we do not distinguish left from right). Hence we obtain the recursion $b_n = \frac{1}{2}\sum_{k=1}^{n-1} \binom{n}{k} b_k b_{n-k}$ for $n > 1$ with $b_1 = 1$ This sum corresponds to half the coefficient of x^n in the square of the exponential generating function $B(x) = \sum_n b_n \frac{x^n}{n!}$, and implies $B(x) = x + \frac{1}{2}B^2(x)$. (2)

In comparing equations (1) and (2) Douglas noted that $B(x)=xC(x/2)$, so comparing coefficients this implies $2^{n-1}b_n = n!c_{n-1}$ for $n \geq 1$. A hurried numerical check of the first few values: $b_1 = 1$, $b_2 = 1$, $b_3 = 3$, $b_4 = 15$, $b_5 = 104$ and $c_0 = 1$, $c_1 = 1$, $c_2 = 2$, $c_3 = 5$, $c_4 = 14$, confirmed this observation. Of course numerical agreement demands a constructive bijection.

We then noted that as a planar tree with n - 1 edges has n distinguished vertices, so $2^n c_{n-1}$ counts the number of planar trees with n - 1 edges, with the vertices labelled by [n]. The n-trees (with leaves labelled by [n]) are not

planar, indeed a Biologist wishing to present such a tree on paper has a left/right choice at each of the n - 1 internal vertex, hence there are 2^{n-1} distinct embeddings of n-trees in the plane.



Thus we seek a bijection between the set C of planar rooted trees of n vertices, with the vertices labelled by $[n]$, and the set B of planar rooted binary trees of n leaves, with the leaves labelled by $[n]$. For a planar n-tree in B, this is achieved by shrinking the left edge above each internal vertex of T to a vertex, and deleting the root edge, to produce a tree in C. Conversely, given any tree in C, at each labelled non-leaf vertex v, add a new edge (v,v') up and left, and move all but the rightmost subtree above v (including the labels) to v'. Finally add a root edge below the root of T. This produces a tree in B.

John Butcher butcher@math.auckland.ac.nz