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NEWSLETTER

OF THE

NEW ZEALAND MATHEMATICAL SOCIETY

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PUBLISHER'S NOTICE

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The newsletter is available at: http://IFS.massey.ac.nz/mathnews/NZMSnews.shtml
Editorial enquiries and items for submission to this journal should be submitted as text or LaTeX files to r.mclachlan@massey.ac.nz.

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EDITORIAL

AVE ATQUE VALE

The mathematics scene in New Zealand has changed enormously since I, godwits return, joined Massey in 1994. Then, there was a single maths conference in a year, the Colloquium; now, more than 10 a year are reported in the Newsletter, plus several one-day meetings. In the early 1990s there were 2 or 3 PhD graduates per year. Since 1997 there have been more than 14 per year. In 1994, the only avenue for significant research funding was the Public Good Science Fund, which famously had no category for pure research; in 2005, the Marsden Fund awarded $2.9m to 9 projects in the mathematical sciences, and the NZIMA awarded $1.2m to its semester programmes, scholarships, Maclaurin Fellows, and small grants. In the 2003 PBRF round, mathematics scored well, with 13.4% of staff rated A, second only to philosophy. (Our average score of 3.65/10 was ranked only 12th out of 41 subjects, however). Of 222 maths and stats staff, 88 were rated A or B; of 388 CS/IS/IT staff, 103 were rated A or B. In other words, every team of 4 A/B staff in the country could each receive $80K/year in research funding, plus another $80K from their PBRF earnings. Pretty good.

And yet (in the midst of life we are in death) somehow I'm still worried. All this largesse and activity is fantastic for those of us who are involved in it; but meanwhile the more basic concerns of our profession remain unfixed. A quick rehearsal: falling or uncertain rolls; insufficient maths required in other quantitative degrees; not enough maths teachers with maths degrees; EFTS-grabbing within universities; not enough maths graduates full stop. These problems faced by maths departments around the world, but in New Zealand's funding system, they have an immediate financial impact on us. Moreover, the funding model imposes no reward for the quality of the education students receive; quite the opposite. How would our graduates fare if they were tested and ranked internationally? To take just a single observation, I noted while at La Trobe University, Melbourne (not one of Australia's best, but ranked similarly to Massey) that their engineering students have finished all of introductory differential equations by the end of their first year—material that is in our second year DE paper, which is not even required for engineers. Apart from periodic textbook changes, papers cut for efficiency, and a glacial spread of computing and web resources, I have hardly noticed any changes in teaching since 1994.

We could be called to task by either of our bill-payers, the students and the government. Australia has just completed its first assessment of teaching and learning at Australia's 38 universities, distributing $50m to the top 15. The rankings were brutal, with some strong research universities faring well (Melbourne ranked 3rd, UQ 5th, ANU 7th) and others very badly (UNSW 32nd, Adelaide 36th). Many small universities and former polytechs did well. (Each university was ranked from 1 to 38 for graduates' views of the enhancement of their generic skills, of teaching quality and of their overall satisfaction with their university program; the percentage of graduates in full-time employment; those continuing to further full-time study; drop-out rates; and pass rates, and the 7 ranks averaged.) These results partly echo the situation in the United States, where in response to the statement 'The professor makes the subject come alive' the small, teaching-oriented liberal arts colleges like Reed scored at the top, while all the famous research universities scored at the bottom. Research-led teaching?

The AMS took on (OK, talked about) all these problems in its 1999 report *Towards Excellence: Leading a Mathematics Department in the 21st Century* (at www.ams.org/towardsexcellence). The math department at UCLA was one of the case studies of successful departments: 3.5% of all UCLA graduates are in math, one of the highest percentages in the US. On closer inspection, most of these students are studying operations research, applied math, computation, teaching, actuarial science, management, history of science, or premed. Only 10% of their students (a class of 17) were actually majoring in 'mathematics'. In other words, the department has been successful by hanging onto lots of turf, not by promoting traditional mathematics.

With only a little squeak of reluctance, I can see that this has to be the way to go. UCLA also hosts the Institute for Pure and Applied Mathematics, one of several maths research institutes established recently. Look at their schedule of semester-long programmes: in 2000, genomics/geometrically-based motions; in 2001, conformal field theory/large scale networks; in 2002, nanotechnology/symplectic geometry; in 2003, inverse problems/proteomics; in 2004, multiscale geometry & analysis/computational astrophysics; in 2005, multiscale in material and bioscience/cells & materials; in 2006, internet security/random shapes. The programmes of the NZIMA are scarcely less applied. All around the world, the groups that are reaching out and building bridges are thriving, while the others are dying. Speaking at a recent NSF

Workshop on Math Majors (12.8.05), James Keener from the University of Utah (and colleague of our own James Sneyd) described his own math biology program and summed up by saying that

- Interdisciplinarity (not only in Math Biology) has the potential to help revitalize mathematics.
- The current traditional academic culture does not encourage/reward interdisciplinarity. It is not treasured and nourished. Rather, it is often viewed with suspicion and/or disdain.
- Warning: As interdisciplinary mathematics grows (and it will), mathematics departments must decide how to encourage this growth opportunity, or they will lose it. If not Mathematics, then where?

Clearly this is already happening. Even at the recent NZ Mathematics Colloquium, 16 out of 59 talks were on biology. The real challenge will be to make the public and the students know that it's happening and to make them part of it.

I thought I would find a contrary view in Gian-Carlo Rota's *Ten lessons for the survival of a mathematics department* (found in his 1997 book *Indiscrete Thoughts*), remembering his statement that 'mathematics is not and will never be flaky'. In other words, backs against the wall? Not quite:

> Flakiness is nowadays creeping into the sciences like a virus through a computer, and it may be the present threat to our civilisation. Mathematics can save the world from the invasion of the flakes by unmasking them and by contributing some hard thinking. You and I know that mathematics is not and will never be flaky, by definition. This is the biggest chance we have had in a long while to make a lasting contribution to the well-being of Science. Let us not botch it as we did with the few other chances we have had in the past.

* * * * * * * * * *

> If of thy mortal good thou art bereft
> And of thy slender store two loaves alone to thee are left,
> Sell one, and with the dole
> Buy hyacinths to feed thy soul.

Bio-, inter-, nano-, multi-; these will be our bread, but mathematics will remain our hyacinths.

Robert McLachlan
Massey University, Palmerston North

PRESIDENT'S COLUMN

We're all going to die! Avian influenza (Panicus tabloidus) is about to sweep the world, or at least until the lighter British newspapers find something else to sensationalize. As I write this I am on overseas leave in the Zoology Department of Oxford University, and everybody including BBC TV is turning up to find out about bird flu. Eventual death is the only event that occurs with probability one, I think that follows from the Borel-Cantelli Lemma, but what does bird flu have to do with mathematics? Questions of when, how and how many cases are flying around and quantitative answers are demanded. To do this requires some sort of mathematical model, and we are then up against the common misconceptions. It doesn't matter that the human virus does not yet exist, so nobody really knows how it will behave, a computer should be able to predict what is going to happen. Isn't that modeling? Never mind where the parameters came from or what assumptions are made, look at the results. The best bet is that something similar to the H5N1 virus that killed 20–40 million (according to the scientific literature, but 50–100 million according to the papers) in the 1918 pandemic will emerge. A model can be set-up using that assumption, as long as the basis is made explicit and modifications are made as better information becomes available. But a model requires a computer and some graphical output to be believed, at which stage the decision makers get carried away with the results and forget to question the assumptions. The solution of a differential equation is often seen as too theoretical, a view reinforced when assumptions are explicit and perhaps questionable.

I wasted two days on what should be a lesson for the 'computers are modeling' brigade last week, but they are not usually NZMS members so they won't benefit from hearing the tale. As part of a Matlab program I was computing the eigenvalues of three different matrices. I was doing this because they arose in different parts of the model, and I have a non-trivial proof that they have the same spectrum. My problem was that Matlab calculated different eigenvalues for each. The time was wasted checking and rechecking my analytic result, then carefully checking the code, then trying to come up with program modifications to provoke the computer into confessing where the error was. Finally I noticed a subscript 'i' coded as a '1' in a dense part of the program, and fixing this made the eigenvalues coincide. The lesson is that with either 'i' or '1' in the program all the results produced were totally reasonable. I didn't have complex numbers of people infected, or flu behaving in an un-flu-like manner. Without the extra mathematics no warning bells would have sounded. With a flashy front-end I could have convinced the policymakers into advocating bad decisions. How many computer simulation results look reasonable but are produced by a program with a similar gremlin in its interior, meaning that the results are rubbish?

The NZMS has just honoured two applied mathematicians that are definitely not of the 'compute and run' camp. By the time you read this Gaven Martin, NZMS Incoming Vice-President will have presented two NZMS research awards at the RSNZ Awards Dinner. The awards go to James Sneyd of The University of Auckland "for extensive and celebrated contributions in mathematical biology, demonstrating approaches that combine originality with biological realism;" and to Robert McLachlan of Massey University "for creative, pioneering work leading to deep advances in the theory of geometric numerical integration, and its application in the study of dynamical systems." Our congratulations go to James and Robert for this recognition of their outstanding contributions to mathematics. But there's more! We are not alone in our recognition. James Sneyd has been made a Fellow of the Royal Society of New Zealand. The RSNZ describe him as "one of the world's leading mathematical biologists ... His modelling is characterised by ingenuity, technical prowess and a clear understanding of biological phenomena at an appropriate level of detail." Robert McLachlan has also received the Individual Researcher Award from Massey University for 2005; the university's website states that "He is acknowledged by leading figures in the field as simply brilliant and there can be no question about the high regard that he is held in by his peers."

The NZMS has two new fellows: Igor Boglaev and Kee Teo, both of Massey University in Palmerson North. I would like to congratulate Igor and Kee on their achievements and thank the committee for giving their time to assess the applications. The NZMS council has also decided to make John Shanks of the University of Otago an Honorary Member of the Society, in recognition of his many years of work as the membership secretary. Our thanks go to John for his efforts on our behalf.

A final bouquet to Robert McLachlan for editing the NZMS newsletter since 2000. This is his last issue and he deserves our thanks for the outstanding way in which he has carried out the task.

Mick Roberts

LOCAL NEWS

AGRESEARCH

Kumar Vetharaniam travelled to the USA in July where he was an invited speaker at the American Dairy Science Association's Lactation Biology Symposium in the ADSA-ASAS-CSAS Joint Meeting, Cincinnati Ohio, July 24–28, 2005.

The title of his talk was: 'Peak and persistency: the mathematics of the lactation curve', reporting on joint work with S. R. Davis and E. S. Kolver.

Rajiv Chaturvedi also visited the USA recently and writes...

I recently attended two conferences which brought to focus the continuing role mathematics and modeling has been playing in biological sciences.

The first one was the Sixth International Conference on Systems Biology held from October 19–24, 2005 in Boston, Massachusetts, USA (web site: http://csbi.mit.edu/icsb-2005). Held jointly at the Harvard Medical and the MIT, the conference comprised of invited and contributed talks and posters, tutorials and workshops. The subject areas covered a wide range of tools and techniques for purposes ranging from bringing organization into the explosive growth of data in biological sciences to predictive application of mathematical techniques. My presentation in this conference was: "Network modeling of symbiotic metabolic interactions of Ryegrass and its Endophyte", by Rajiv Chaturvedi, Tanya Soboleva, Anthony Parsons and Susanne Rasmussen (all from AgResearch Limited).

The second conference I attended was the biannual "Biocomplexity" workshops organized by a consortium of universities in Indiana, USA. This time its theme was "Applications of Methods of Stochastic Systems and Statistical Physics in Biology", and it was held at University of Notre Dame, Notre Dame, IN, USA, from October 28–30, 2005 (web site: http://www.nd.edu/~icsb/wrkshp2005.html). The deliberations ranged from discussing theoretical properties of mathematical models that have been used in many biological problems, to application of these models to explain biological observations. I talked about the application of a hybrid model that I had worked on earlier for skeletal patterning of an avian limb bud in the Limb Development workshop that was held at the end of the conference. This model combines a stochastic discrete model for cells and a deterministic continuum model for diffusible morphogens with a regulatory network to describe the complex biological phenomena of skeletal patterning in a growing limb domain.

Ken Louie

THE UNIVERSITY OF AUCKLAND

Department of Computer Science

Dr Beryl Plimmer has been the Director of Programmes, and now she has been appointed as Senior Lecturer in Human Computer Interaction. Beryl has particular interests in pen-based interfaces, and particularly in the use of sketch-based approaches to early design of computer systems.

Jim Warren has arrived to take up his appointment as Professor of Health Informatics. That is a joint position in Computer Science and the School of Population Health, and he will be based at Tamaki Campus.

Bakh Khousssainov has been elected a Fellow of the Royal Society of New Zealand.

John Hosking has been Head of Department for two terms, and Robert Amor will succeed him on 1 February 2006.

Reinhard Klette and Robert Amor were hosted at the Microsoft Research Asia Faculty Summit 2005 in China at the end of October.

Alexei Drummond and Dr David Bryant (Mathematics) have received a Marsden Fund grant of $555,000 for their research project on "The statistics of phylogenetic networks". Hans Guesgen has been awarded a one-year grant from Kiwiplan Ltd for a project on optimization of packing designs. Both of the Department's major FRST grants (Clark Thomborson and John Grundy plus John Hosking) have obtained rollover for an additional year. John Hosking, Janet Copsey and Stephen Whiteside have received a VCUDF Grant of $100,000 for "Raising strategic understanding and application of ICT at The University of Auckland".

Dr Bodo Rosenhahn has been a Postdoctoral Fellow at CITR for two years. At the 27th annual DAGM symposium (of the German, Austrian and Swiss Associations for Pattern Recognition), his paper "A system for marker-less human motion estimation" reported on joint research of Computer Science and Sports Sciences at Tamaki campus (in collaboration with Universitaet Saarbruecken). That paper was awarded the Main DAGM Prize 2005 "in appreciation of outstanding work, effort and enthusiasm shown in the preparation and presentation of the paper". In November Bodo became

the Chair of a research group at the Max-Planck Institute in Saarbruecken, and he intends to maintain his links with our Department.

Yang Jia has completed his PhD on "Fast String Parsing and its Application in Information and Similarity Measurement", and Linjiang Yu has completed his PhD on "Partially Supervised Texture Segmentation and Retrieval".

Nodira Khoussainova, now aged 18, is the daughter of Muharram and Bakh, both of whom are now overseas on leave. After graduating BSc with 1st-class honours in computer science, Nodira gained a research internship at Microsoft headquarters. She is now in the first year of doctoral studies at the University of Washington. In Auckland, the North Harbour Club Tower presents AIMES Awards to young people (aged 25 or younger) from North Harbour who have shown exceptional talent in the arts, information technology and science, music, education and sport. The Khoussainov family came back to Auckland for the 2005 AIMES Awards, which were presented at the Bruce Mason Centre on October 8th. Nodira received the overall award for excellence and also the award for excellence in information technology and computer science, totalling $17,000.

Seminars

Veikko Keranen, "Abelian pattern-free words."

Peter Gacs, "Uniform tests of algorithmic randomness over a general space."

Simson Garfinkel, "Johnny 2: a user test of key continuity management with S/MIME and Outlook Express."

Gyori Sandor, "Tree algorithm for collision resolution."

Paul Vitanyi, "Automatic meaning discovery using Google."

Osmar Zaiane, "The potential of associative classifiers."

Rebecca Weber, "Kurtz 2-randomness."

Professor Douglas Bridges (University of Canterbury), "Apartness on lattices."

Anirban Majumdar, "Manufacturing opaque predicates for control-flow obfuscation."

Faith Ellen Fich, "How hard is it to take a snapshot?"

Garry J. Tee

Department of Mathematics

Dr Antonius Frederick Maria ter Elst (Eindhoven University of Technology) has accepted the offer of a Lectureship in our Department. We expect to see him in the new year.

Bill Barton spent two days visiting Polytechnics and Universities in Singapore for the Faculty of Science, investigating possible articulation of students from those institutions.

Anthony Blaom had been on unpaid parental leave for a year, and he has decided not to return to the Department. He has been appointed as Honorary Researcher.

David Bryant (& Alexei Drummond in the Department of Computer Science) have won a Marsden Research Grant of $555,000 for their project on "The statistics of phylogenetic networks".

Bruce Calvert has received a $4500 grant from the Staff Research Fund, for "Winner-take-all neural networks".

Colin Fox has received a $5000 research grant from ISAT Linkages Fund for "Meshing, multigrid and MCMC". Colin Fox & James Sneyd have received a $9000 grant from the Staff Research Fund for "Modelling the contraction of airway smooth muscle".

David Gauld has won a Marsden Research Grant of $390,000 for his project on "Dynamics on non-metrisable surfaces and manifolds". He gave two invited lectures at the 9th Galway Topology Colloquium in Belfast , and his 1982 book "Differential Topology: An Introduction" has been republished by Dover in its reprint series.

Rod Gover has received a Researchers' Strategic Support Initiative Award of $49,100.

Sina Greenwood has received a New Staff UARC Grant of $6500. Sina Greenwood, Hannah Bartholomew & Colleen McMurchy-Pilkington (Faculty of Education) won $3472 from the Equal Opportunities Office, for a longitudinal study of Maori mathematics students in Northland.

Mike Meylan has received a New Staff UARC Grant of $8600 for "Wave scattering by infinite and semi-infinite arrays".

Boris Pavlov has received a research grant from ISAT Linkages Fund for "Transport properties and mathematical modelling of quantum networks", and he gave an invited lecture at the College of Sciences, Massey University.

Philip Sharp has received a $1750 grant from the Staff Research Fund, for "Multi-pole methods for simulating the solar system".

Jozef Siran has received a grant from the Staff Research Fund.

Arkadii Slinko has become a founding member of the ARC Economic Design Network, which received funding ($AU300,000 per year) from the Australian Research Council for the next five years. He will be a semi-funded invited speaker at the 2nd Pan-Pacific Conference on Game Theory on November 24–26, at Taipei.

James Sneyd has been elected a Fellow of the Royal Society of New Zealand, and he has been awarded a research grant from the University of Massachusetts Medical Center. James Sneyd & Robert McLachlan (Massey University) have jointly won the NZMS Research Award for 2005. James Sneyd & Colin Fox have received a $9000 grant from the Staff Research Fund, for "Modelling the contraction of airway smooth muscle".

Mike Thomas returned from leave, during which he gave seminars or workshops at the Chinese High School of Singapore, University of Swansea, Warwick University, Open University, Plymouth University, and the University of Grenoble. He has won a $20k+ grant to use the University's nuclear Magnetic Resonance Imaging machine to examine brain functioning of people while they do mathematical tasks. He is linking with people in Psychology and a researcher in Turin. And Mike has been appointed as "Specialist Adviser" to the PBRF Review panels on Mathematics Education.

Shixiao Wang has received a grant from the New Staff Research Fund.

A Departmental professors' committee has allocated grants to Bill Barton, Colin Fox, Sina Greenwood, Vivien Kirk, Mike Meylan, Philip Sharp, Arkadii Slinko, Steve Taylor and Mike Thomas, totalling $27,000.

Visitors

Professor Len Bos (University of Calgary),

Dr Andreas Cap (University of Vienna),

Dr Heiko Dietrich (Technische Universitaet zu Braunschweig),

Professor Bettina Eick (Technische Universitaet zu Braunschweig),

Professor George Havas (University of Queensland),

Dr Frank Himstedt (Munich University of Technology),

Dr Carolyn Kieran (University of Quebec á Montreal),

Dr Ville Kolehmainen (University of Kuopio, Finland),

Dr Martin Macaj (Comenius University),

Professor John Mason (Open University),

Professor Mike Newman (ANU),

Professor Cheryl Praeger (UWA),

Dr Anne Watson (Oxford University),

Professor Wolfgang Willems (Universitaet Magdeburg),

Professor Mariusz Wodzicki (University of California - Berkeley).

William Rowan Hamilton's 200th birthday was celebrated around the world on 3 August 2005. Hamilton's sister Sydney Margaret Hamilton (1811–1889) became his principal astronomical assistant. She settled in Auckland in 1875 and was befriended by Sir George Grey, who was then studying quaternions.

The NZMS and the New Zealand Institute of Physics sponsored a public lecture by Garry Tee on William Rowan Hamilton, given on Hamilton's 200th birthday. That lecture was repeated at The University of Waikato, on October 27. A Library display was set up in The University of Auckland General Library (for July and August), including copies of some of the very rich collection of Hamilton's manuscripts and publications in Auckland City Central Library.

Our Department hosted the 2005 Albany-Auckland-Waikato Applied Mathematics Day on Friday September 9. The following lectures were given:

Dr Garry Tee, "Surface integrals over ellipsoidal segment."

Inga Wang, "A model for smooth muscle contractions in the lung."

Basil Sinescu, "Good rank-1 lattice rules based on the general weighted star discrepancy."

Professor Graeme Wake (Massey University (Albany)), "A model of transient cell-growth."

Elan Gin, "Cellular calcium and buffers."

Leng Leng Lim, "Modelling of volcanic ashfall."

Professor John Butcher, "Towards efficient general linear methods."

We took advantage of the presence of a number of visitors at The University of Auckland to hold a 2-day workshop on Group Theory on November 1 and 2. That meeting acknowledged the 65th birthday on November 2 of one of our frequent visitors and collaborators: Professor Charles Leedham-Green from Queen Mary College, University of London.

The following lectures were presented at the Workshop:

Professor Marston Conder (Auckland), "Connectedness of generating sets for finite groups."

Professor Bettina Eick (Technische Universitaet zu Braunschweig), "Periodicity and the automorphism group conjecture."

Dr Ben Martin (University of Canterbury), "Coclass, p-adic integration and elimination of imaginaries."

Professor Mike Newman (ANU), "Groups with exactly three involutions."

Professor George Havas (University of Queensland), "4-Engel groups are locally nilpotent."

Professor Gaven Martin (Massey University (Albany)), "Automorphisms of hyperbolic groups and open maps of manifolds."

Dr Andre Nies (Department of Computer Science), "Groups with finite descriptions."

Dr Henrik Baarnhielm (London), "Constructive recognition of the Suzuki groups."

Associate Professor Jozef Siran (Auckland), "Regular maps on a given surface—a survey."

The Workshop concluded with a special lecture by

Charles Leedham-Green, entitled "Apologia pro vita sua."

We welcome Laura Ciobanu to the Department as a University of Auckland Postdoctoral Fellow for two years. She is a a recent graduate of Rutgers University, and her research interests are in algebra. Caroline Poisard has been appointed to a post-doctoral position for one year starting in January. She will work with Bill Barton in the area of Ethnomathematics.

Mala Nataraj has enrolled for a PhD concerning Vedic Mathematics, and Garry Nathan has enrolled for a PhD on Undergraduate Conceptions of Reasoning and Proof.

Matthew Auger and Elan Gin have been awarded UoA guaranteed doctoral scholarships.

On November 4, the prominent businessman Michael Erceg was flying a business associate from Auckland to Queenstown. The helicopter disappeared in very stormy conditions, and 15 days later the wreckage was found near Raglan. David Gauld had sent the following message around our Department:

Dear colleagues,

Perhaps not many of you are aware that the missing businessman, Mike Erceg, was a student in the Department as well as a colleague.

Mike completed his BSc(Hons) and MSc degrees in this Department, gaining a Fowlds Memorial Prize for the top masters student in the Faculty of Science in his year before heading to the University of California at Berkeley where he completed his PhD in Functional Analysis in 1981. After his return to New Zealand he taught part-time in the Department for several years and at least one of our colleagues recalls with fondness his graduate course in Functional Analysis taught to him by Mike. When his work in the family vineyard became too onerous he stopped teaching in the Department.

More recently with a group of Industrial Mathematics staff I visited Mike's business premises where we investigated whether some sort of project for the IM Programme might be set up there. He paid a return visit to the Tamaki Campus with a number of his staff to talk to IM students.

Mike was a welcoming and gracious host when we visited him and I for one am very saddened by his disappearance last Friday.

Regards,

David Gauld

Seminars

Professor Winfried Kohnen (Heidelberg), "On infinite product expansions of modular functions."

Dr Jana Siagiova, "Applications of coverings in Cayley maps and in the degree-diameter problem."

Professor David Gauld, "MOPping up."

Dr Primoz Potocnik, "Tetravalent edge-transitive graphs and related topics."

Dr Tsukasa Yashiro, "Diagrammatic approaches to surface-knots - 1-handles and triple points."

Dr Anthony D. Blaom, "The ghost of symmetry in a curved world."

Professor Mariusz Wodzicki (University of California—Berkeley), "Exotic traces."

Dr Sina Greenwood, "Characterising continuous functions on connected compact spaces."

Professor Wolfgang Willems (Universitaet Magdeburg), "Some open problems in modular representation theory", "Are cyclic codes asymptotically good?", and "A survey of problems and methods in coding theory."

Dr Frank Himstedt (TU, Munich), "Low-dimensional representations of Steinberg's triality groups."

Dr Sasa Radomirovic (Rutgers University), "Cusp forms over function fields and modular symbols."

Dr Andreas Cap (University of Vienna), "Infinitesimal automorphisms and deformations of parabolic geometries."

Professor Cheryl Praeger (UWA), "Groups, probability, algorithms: computing with giants."

Dr Laura Ciobanu, "Fixed subgroups in free groups."

Professor C.K. Raju (University of Bhopal, India), "Series expansions and the computation of Pi in India from Aryabhatta to Yuktideepika," and "The Indian origins of the calculus and its transmission to Europe prior to Newton and Leibniz. Part 2: Lessons for mathematics education."

Christopher Hay, "Metrizability of compact convex sets under certain criteria."

Dr Hyuck Chung, "Modelling timber-based floor structures."

David Choquenot (Landcare Research), "Mathematical models and wildlife population dynamics."

Daniel Watzenig (Graz University of Technology), "Electrical capacitance tomography at Graz University of Technology: state-space representations and particle filtering."

Dr Carlo Laing (Massey University (Albany)), "Equation-free modelling: some neural examples."

Dr David Bryant, " Continuous and (mostly) tractable models for the variation of evolutionary rates."

Dr Emily Lane (UCLA), "Wave-current interactions and shore-connected bars."

Professor Roman Nedela (Slovak Academy of Sciences), "Enumeration of maps and hypermaps with given genus and given number of edges."

Garry J. Tee

Department of Statistics

Russell Millar appeared on the television program "John Campbell Live" in early July. His briefing was to tell the audience the probability of winning Lotto—although we all know that if Russell really had inside Lotto information, we'd be advertising for a new lecturer. The segment was created by Jacqui Brown and her crew, and was filmed in a lecture theatre on the Tamaki campus. The style was light-hearted, but nonetheless demonstrated some solid statistical points, including conditional probabilities and misuse of the "law of averages". Russell's night of fame has been recorded for posterity, and it will be played in our first-year lectures for years to come.

Russell Millar and Marti Anderson have been dividing their time between Perth, Auckland, and Alaska in their work on fisheries and multivariate ecological analysis.

The Rodent Invasion Research Group spent a total of two weeks rat-catching in the Bay of Islands. With the Department of Conservation, Steven Miller helped set up the traps, then the next week Rachel Fewster went to bag the rats with Stephen Cope as cameraman. The trip was exceptionally successful, with a total of 360 rats bagged for the DNA project.

Doctoral student James Russell spent time in Brazil to give a student finalist talk at the Society for Conservation Biology. He then travelled to Oregon for the Association of Pacific Rim Universities Annual Doctoral Students Conference on the

multidisciplinary theme "Moving Towards a Sustainable Future". A paper on "Intercepting the first rat ashore", written by James Russell and others from the Rodent Invasion Project/Research Group (D.R. Towns, S.H. Anderson & M.N. Clout) tells of a rat which was released on Motuhoropapa (one of the uninhabited Noises Islands) which then swam 400 metres to the island Otata. That paper was published in NATURE 437(7062): p.1107, and it has attracted attention around the world. The story was run by over 100 international news agencies, from the UK Independent to Washington National Public Radio, and it also included a feature on NZ TV news.

Tim Langlois has gained his PhD, for his thesis "Influence of reef-associated predators on adjacent soft-sediment communities". He has been based at the Leigh Marine Laboratory. Yuichi Hirose has completed his PhD.

An NZIMA Postgraduate Scholarship has been awarded to Adam Smith for a Masters thesis project at The University of Auckland (from July 2005) on the statistical validation of the NZ Marine Environment Classification, under the supervision of Drs Marti Anderson and Clinton Duffy. Mike Manning, who is studying for his MSc while working for NIWA in Wellington, appeared on "60 Minutes" in April in a piece about the satellite tagging of white sharks.

IASS 55 was organised and run by this Department and held at the Maritime Museum in Auckland, New Zealand. Alastair Scott chaired some of the sessions. C.R. Rao spoke to a packed room in this Department. In his talk he covered a history of statistics.

From June 2 to 7 the SRTL-4 conference was held at Grafton Hall. It was organised largely by Ross Parsonage and Maxine Pfannkuch, along with input from Dani Ben-Zvi, Joan Garfield, and others. Rachel Cunliffe, Ross Ihaka, Chris Wild, Mike Forster and Ilze Ziedins attended ISI 55 in Sydney, Australia.

Seminars

Dr Beatrix Jones (Massey University (Albany)), "Fitting and interpreting sparse Gaussian graphical models for high-dimensional data."

Associate Professor David Whittaker (The University of Waikato), "The state of the art in the generation of efficient statistical designs."

Associate Professor Russell Millar, "Local sensitivity of Bayesian inference to priors and data."

Dr W. Paul Malcolm (ANU), "New Gaussian mixture techniques for filtering and smoothing of discrete-time Gauss-Markov jump Markov systems."

Dr Stephane Guindon (Bioinformatics Institute), "Statistical modelling of the natural selection processes acting on protein sequences."

Dr Ross Ihaka, "Colour me ... carefully."

Dr Roger Marshall (School of Population Health, Epidemiology and Biostatistics), "Use of scaled rectangle diagrams to visualize categorical data, with particular reference to clinical and epidemiological data."

Professor Goeran Kauermann (University of Bielefeld/UNSW), "Penalized spline smoothing and generalized linear mixed models—some theory and applications."

Garry J. Tee

UNIVERSITY OF CANTERBURY

Department of Mathematics and Statistics

Dr Mike Plank will be taking up a position as Lecturer from 2006. Mike does mathematical modelling, especially of problems arising from biology. In current joint work with David Wall and Tim David (Engineering), he is studying the early stages of cardiovascular disease by modelling blood flow in the human body. He finished his PhD at the University of Leeds in 2003 then began a postdoctoral job here in February 2004. Mike has already been making himself useful around the place and he is a welcome addition to the department.

Another current Postdoctoral Fellow, Dr Simona Vîta, will be staying here for a further year. Her new position is supported by the FoRST/NZ Science & Technology "Bridge to Employment" scheme.

Dr Paul Mullowney is a recent arrival. He started a two-year university-funded postdoctoral fellowship in June 2005. Paul is working with Alex James on stochasticity in biological processes. He completed his PhD on dynamical systems and fluid mechanics at the University of Colorado at Boulder in 2004.

Professor Ian Stewart, who is well known as a mathematician and an expositor, visited

Christchurch in September. He delivered a keynote speech at the New Zealand Association of Mathematics Teachers Biennial Conference as well as giving a departmental colloquium.

Douglas Bridges was awarded a standard Marsden grant for his project "Constructive reverse mathematics". The project has two main aims: to classify constructive theorems according to the proof principles that are necessary to establish them, and to classify essentially nonconstructive theorems according to the nonconstructive proof principles that they require for their proof. Ben Martin and Gerhard Röhrle (Southampton) were awarded a standard Marsden grant for their project "A geometric approach to reductive algebraic groups". They will use geometric techniques to study reductive algebraic groups and their subgroups, and the way in which they act on their associated buildings.

Rick Beatson was an invited speaker at the SIAM conference on Geometric Design and Computing in Phoenix, Arizona in October/November. Douglas Bridges and Simona Vîta visited Munich to work with Peter Schuster and Josef Berger, and spoke at the Computability & Complexity in Analysis meeting in Kyoto in August. In September, Mike Steel gave talks in Canada, UC Berkeley and at the Mathematical Biosciences Institute in Ohio, which hosted a special workshop on Phylogenetics and Self-Organization in Ecology. The 10th annual phylogenetics meeting will be held in Kaikoura, from 12–17 February 2006. Ben Martin gave a talk at the November Group Theory workshop at the University of Auckland, which was held to celebrate the 65th birthday of Charles Leedham-Green.

Professor Dominic Welsh (University of Oxford) is currently visiting as part of the University of Canterbury and University of Oxford exchange program. The exchange is teaching-based and as a result, Dominic has been lecturing second year graph theory as well as a fourth year matroid theory course. Other recent and current visitors include Tanja Gernhard (University of Münich), Dr Granville Tunnicliffe-Wilson (Lancaster University), Dr Emily Lane (UCLA), Dr Jon Pitchford (University of York) and Professor Minoru Murata (Tokyo Institute of Technology).

John Hannah organised a sequence of mathematical enrichment talks for schoolpupils during the second half of the year. The talks covered topics ranging from complexity in computing to algebra to patterns and pictures. In a talk on proof in mathematics, a well-known "proof" was presented of the proposition that Girls are Evil. The audience was challenged to give a proof in a similar spirit that Boys are Evil. Here is the winning entry, by Jamie McCloskey and Joan McArdle.

BOYS ARE EVIL

Let us start with the singular of the gender, i.e., BOY. We find that the inverse of BOY is YOB (i.e., from right to left). So we have:

$\mathrm{BOY}^{-1} = \mathrm{YOB}$.

We all know that in order to behave in a yobbish fashion, the yob must be alive:

YOB = LIVE.

Now we can invert both sides as follows:

$\mathrm{YOB}^{-1} = \mathrm{LIVE}^{-1}$.

On calculating the inverses of each side we are left with:

BOY = EVIL.

So we have proven that BOY = EVIL. Let us multiply both sides by two:

2 * BOY = 2 * EVIL.

This can be reduced to:

BOYS = 2 EVIL

We feel we ought to be awarded the prize for this because, not only have we proven that boys are evil, we have proven they are more evil than evil — in fact, they are too evil.

The prize was a $20 book token.

Seminars

Professor Daniel Naiman (Johns Hopkins University), "Abstract tubes."

Professor Daniel Naiman (Johns Hopkins University), "Use of gene expression comparisons for classification of tissue samples."

Dr Christopher Paul Tuffley (University of California Davis), "Finite subset spaces of the circle."

Dr Stefan Grunewald (University of Canterbury), "Thin quartet sets."

Dr Thomas Forster (University of Cambridge), "De-linearising Ehrenfeucht-Mostowski."

Professor Ian Stewart (University of Warwick), "Network models of sympatric speciation."

Dr W.P. Malcolm (Australian National University), "State and mode estimation for discrete time-jump Markov systems."

Dr Granville Tunnicliffe Wilson (Lancaster University), "Assessment of empirical non-linear time series prediction tools."

Professor Michael McAleer (University of Western Australia), "Generalized autoregressive conditional correlation, scalar BEKK and indirect DCC."

Liam Wagner (University of Queensland), "Representations of finite groups and pre-monoidal categories."

Ben Martin

MASSEY UNIVERSITY

Institute of Fundamental Sciences (Palmerston North)

Mathematics

Partir cest mourir a peu

From Dean Halford:

"Gillian Thornley is retiring after nearly 26 years at Massey University, having joined the mathematics staff in 1980 when Brian Hayman was Head of Department. Following her graduation with a First Class Honours MSc from the University of Canterbury in 1963, Gillian obtained a PhD in metric differential geometry from the University of Toronto in 1965 under the supervision of Professors Hanno Rund and Ray Vanstone. She returned to New Zealand where she lectured for two years at the University of Canterbury before marrying John Thornley and taking up a lectureship at the Trinidad campus of the University of the West Indies. Then it was back to Nelson where Gillian and John's children, Louise and Matthew, were born and where Gillian did some part-time teaching at Nelson Polytechnic. In 1973 the family moved to Wellington where Gillian obtained mostly part-time positions in Wellington College of Education, Wellington Polytechnic, Victoria University, and held a research position in the Department of Mines.

Gillian has had an outstanding career. She is highly respected by staff and students as a top-level teacher, winning three Institute of Fundamental Sciences' Distinguished Teaching Awards. Further distinction was the invitation from The University of Auckland to deliver the 1996 Aldis Lecture; her address was entitled From Descartes to Aldis and Beyond: A Geometrical History. Gillian has given fine support and encouragement to all of her students; her personal qualities of patience, integrity, fairness and professionalism are almost legendary. Gillian's research interests lie mainly in differential geometry, in particular the study of Finsler spaces, but her work on gender issues in mathematics education led her to publish and speak at overseas conferences.

Gillian's professionalism has been exercised in the wider community where she has given much to the development of mathematics and mathematics education. For 14 years, from 1978 to 1992, Gillian contributed to the activities of the New Zealand Mathematical Society in several roles, becoming President of the Society for two years in 1989. She will be remembered for her wise and capable leadership during a challenging period, and represented the Society at the IMU meeting in Kobe, Japan, where she was the only woman president present. Indeed, Gillian is the only woman President of the NZMS since it was founded in 1974. In 1997 she was elected a Fellow of the New Zealand Mathematical Society and in December 2004 the Society awarded Gillian Honorary Membership status.

In addition to the Mathematics Department and numerous boards and committees at Massey University, Gillian has also contributed much to the Manawatu Mathematics Teachers' Association. Always this was characterized by her superb organizational skills, her grasp of the mathematics curriculum, her concern for student welfare, and her representation of women in academia.

Gillian's professionalism, depth of experience, superior teaching skills and guidance on student matters will be widely missed. We wish her a long and happy retirement."

Alas, we also had to say farewell to Professor Andrew Vince. His sunny nature will be missed and also his excellent contribution towards our teaching programme and research.

Charles Little has itchy feet again and will be going on an year's sabbatical to the Federal University of Mato Groso do Sul, Campo Grande, Brazil. He will be visiting Marcelo de Cavallo. Desejamos Bàrbara e Charles um tempo agradàvel em Brasil.

On a more happy note:

Congratulations to

- Kee Teo and Tammy Smith for securing a Massey University award "Fund for Innovation and Excellence in Teaching" for the project "Developing MathsFirst: A web-based system to enhance first year mathematics teaching and learning." Last year they were also successful in obtaining a grant.
- Gillian Thornley and Igor Boglaev who have been made Fellows of the New Zealand Mathematics Society.

- Robert McLachlan who was awarded a Massey University Research Medal and also won the New Zealand Maths Society Research Award for 2005.

- Jonathan Marshall who successfully defended his PhD thesis: "Holomorphic Solutions to Functional Differential Equations."

To take note of the above events the mathematics mob and associates went to a Thai Restaurant for lunch. Normally this restaurant does not open till 17:00 but they specially opened for us again (for the 4th time)!

Igor Boglaev spent two weeks (14.08.05–28.08.05) working with Assoc Prof S. Wang (School of Mathematics and Statistics, the University of Western Australia, Perth) on the joint research project "Novel Numerical Methods for Modelling Semiconductor Devices." His visit was supported in part by the University of Western Australia.

Bruce van Brunt visited KAIST in South Korea for two months. He came as part of an applied mathematics visiting professor team and lectured on the calculus of variations among other topics. Missing the hot humid summer, he enjoyed two months of autumn weather and the hospitality of the Koreans. Rumour has it that he spent many weekends tramping around various local national parks.

Allan Wilson Centre news—Mike Hendy reports:

"Our congratulations to Barbara Holland on winning the trifecta! Barbara completes her NZS&T post-doctoral Fellowship with the Centre in February, but will be rehired as a Research Fellow within the Centre, with the assistance of a FRST "Bridge to Employment" grant which will meet 50% of her salary for the first year. This is on top of her recent successes in winning a FULL Marsden grant in the 2005 round as sole PI, and her success in being awarded the 2005 Hamilton Memorial Prize, by the RSNZ Academy, for her "pioneering mathematical research in evolutionary biology, including the development of new instruments for phylogenetic network representation. The prize recognizes her achievements in the conception and application of sophisticated mathematical and statistical techniques to evolutionary biology, especially in the representation of phylogenetic networks and trees. (A phylogenetic tree is a graphical means to depict the evolutionary relationships of a group of organisms.) With her solid background in operations research, Dr Holland has developed novel tools for representing the conflicting information that arises in many studies of evolutionary relationships, where a large collection of phylogenetic trees occurs as opposed to a single tree." Congratulations Barbara.

The AWC has hosted six German 4th year exchange students from the Biomathematics programme at Greifswald for this semester. They each did a paper in Computational Biology, and in Bioinformatics, as well as some advanced mathematics papers. The project reports from their Computational Biology papers were all excellent, and we expect most will be incorporated in research publications currently under preparation. This is the third group to come form Greifswald, we are expecting a larger number next year.

Bernard Beckett, our RSNZ Teaching Fellow for 2005 is just completing his year with us, before he returns to Onslow College (Wellington) where he teaches maths, economics and drama. This has been an excellent placement for us, and we hope to have a report from Bernard in the next newsletter. During this year Bernard was awarded the NZPost and NZ Bookseller's prizes for his teenage novel "Malcolm and Juliet." Bhalchandra Thatte has recently returned from Spain (via India). He reports:

"I visited Centre de Recerca Matematica, Bellaterra (near Barcelona) for a month in September and October. There were two courses on Random Graphs (by Bela Bollobas) and Graph Homomorphisms (by Jaroslav Nesetril). The courses were followed by two more conferences—one on Graph Morphisms and Applications and another on Tutte Polynomials and Applications. The courses and conferences were exciting and have given me enough food for thought. The conference on Tutte polynomials had several presentations on problems related to statistical mechanics. The Spanish weather during that time was also not bad. On the way to Spain I visited my home in Pune, India. My niece Vaidehee recently represented India at the International Mathematics Olympiad in Mexico. Although she didn't win a medal, she did win a prize for the best solution of the most difficult problem! She is now pursuing B.Math. Honours at the Indian Statistical Institute in Bangalore. In India, now there is a lot of encouragement and scholarships for students who participate in the Olympiad or are selected for the "base camp". The state level Olympiads are now attracting increasing number of students, many of whom want to do research in mathematics or theoretical computer science. It is good to see mathematics successfully competing with professional courses for the best students! I am sure we will see more Olympiad medals and more mathematicians from India in future."

Seminars

Professor Mike Steel (University of Canterbury), "Hungarian chicken scratchings—a new weapon in the war on error."

Professor Robert McLachlan, "Boundary layer separation in high-speed flow."

Tilak Ratnanather (Centre for Imaging Science, The John Hopkins University), "Computational anatomy: shape analysis of brain, cortical, cardiac and dendritic structures."

Professor Andrew Vince, "Tiling Euclidean space" and "Rep-tiling Euclidean space."

Graduate Seminars Series

Dion O'Neale, "Split-step methods for highly oscillatory non-linear problems."

Philip Zhang, "Three lectures on partial differential equations" and "Applications of semigroup theory to PDE's."

Marijcke Vlieg-Hulstman

Institute of Information and Mathematical Sciences (Albany)

Beatrix Jones, Alona Ben-Tal and Winston Sweatman were all successful in the latest Marsden Fund round. Beatrix has received a Fast Start Grant "Design of parentage analysis experiments: a case study for understanding uncertainty in models with latent (unobserved) variables." Alona also received a Fast Start Grant, "A new mechanism for Cheyne-Stokes respiration?" Winston is an associate investigator on the Astronomy project: "Microlensing: a new way to explore the Galaxy" which is led by Ian Bond (also from IIMS). Both Beatrix and Alona have positions available for MSc students (http://iims.massey.ac.nz/scholarships/jones_Masters.htm, http://iims.massey.ac.nz/scholarships/Adv_MasterStudent.pdf) and PhD positions are available with Ian and Winston (http://www.massey.ac.nz/~iabond/projects.htm).

The third (and last) ANZIAM Mathematics-in-Industry Study Group to be hosted in New Zealand is coming up fast. It is being held in Massey University, Albany, Auckland the week Monday 30th January–Friday 3 February 2006. The Minister of Research, Science and Technology, Steve Maharey will open MISG2006 on the Monday. Registrations are free with student-grants available, thanks mostly to CSIRO (Aus) and FRST (NZ). So we invite you all to come for a packed week of brainstorming. FRST have indicated support for ongoing contracts is likely to be available. This year the problems look the best ever. Seven are definite: one from Western Australasia—a real beauty—and three of the seven are biological problems. Regular companies like, NZ Steel, Transpower, and Fisher and Paykel are coming back with some interesting new contributors. Dr Peter Howell from OCIAM, Oxford is coming at our invitation to provide overview support. Director Graeme Wake and his team are really keen to make this the best ever. The Proceedings of the MISG2004 are published and the 2005 version will appear soon. For more details see http://misg2006.massey.ac.nz⟨http://misg2006.massey.ac.nz/⟩ and you can register on this site.

Carlo Laing, Leng Leng Lim, Robert McKibbin, Galkadowite Senaratne, Ratnesh Suri and Graeme Wake all participated in the Auckland-Waikato Applied Mathematics Day at The University of Auckland in September. Graeme presented "A model of transient cell-growth," Sena "Microwave signal processing for breast cancer detection," and Leng Leng "Modelling of volcanic ashfall."

Mick Roberts is back in Europe again. He first visited the Netherlands and is currently at Oxford University as a Visiting Fellow at St Catherine's College. Jo Mann is at the present time (mid-November) visiting Mick for a week.

All the postgraduates were involved in presentations at the IIMS Postgraduate Conference at the end of October. The careful planning and preparation led to a fine day. Jo Mann was again on the conference committee. The Proceedings volume, designed by Jo and compiled by the postgraduates on the Committee, will be a lasting testament to an excellent set of papers, talks and posters.

In November Senaratne Galkowite will be participating in the International Conference on Sensing Technology (ICST 2005) in Palmerston North. He will present "A New Approach to Breast Tumour Detection Using Microwave Frequencies: A Two-dimensional Model", a joint paper with his PhD supervisors Graeme Wake, Winston Sweatman and Rick Keam (Keam Holden Associates).

Mathematics was as usual well represented at the Auckland Marathon/Half Marathon event on Sunday 30th October with aches and pains to show for it and some good times. Jo Mann and Martyn Smit completed the half marathon. It was Jo's first half marathon while Martyn sped to a personal best time for the distance. Shaun Cooper and Winston

Sweatman both completed the full marathon also posting personal best times improving by several minutes on their times from last year.

Jo Mann, who is a member of the Mint Dance Club on campus, also performed display dances for the ASA Ball. (This was a few weeks before her half marathon performance!).

Visitors

Heng Huat Chan from the National University of Singapore.

Wen-Chin Liaw from the National Chung Cheng University, Taiwan.

Michael Hirschhorn from the University of New South Wales.

Bruce Berndt from the University of Illinois.

Mark Nelson (joint with School of Engineering, UA) from University of Wollongong.

Seminars

Boris Pavlov (The University of Auckland), "Solvable models of quantum networks: quantum switch and spin filter."

Winfried Kohnen (Universitaät Heidelberg, Germany), "Representation numbers of integers by positive definite quadratic forms."

Samuel Nosal, "Around a stochastic model for epidemics."

Robert McKibbin, "3 animal courses—quantitatively, of course."

Claire Jordan, "Reliability of the PBRF data."

Wen-Chin Liaw (National Chung Cheng University, Taiwan), "Evaluations of alternating Euler sums."

Wolfgang Willems (Otto-von-Guericke-Universität, Germany), "A survey of problems in coding theory."

Robert McKibbin, "A Model for dispersal of eruption ejecta."

Joanne Mann, "Modelling Measles... Nearly."

Nicolas Smith (The University of Auckland), "Virtual heart disease."

Douglas S. Bridges (University of Canterbury), "Apartness on lattices."

Ratneesh Suri, "Stochastic differential equations (SDEs)."

Michael Hirschhorn (University of New South Wales), "Partitions into four squares."

Sharleen Harper, "Transport of individual droplets in sprays."

Frederick Lam, "The number of solutions of $a^2 + 2b^2 + 2c^2 + 4d^2 = n$ in integers."

Gaven Martin, "Aspects of modern mathematics or what the hell does a pure mathematician do?"

Ulrich Zuelicke (IFS, Massey University at Palmerston North), "Electronics with spin."

Bruce Berndt (University of Illinois), "Ramanujan's life and notebooks."

Winston Sweatman

Institute of Information Sciences and Technology (Palmerston North)

Statistics

Steve Haslett has again been travelling extensively overseas, with recent visits to Minneapolis as an invited speaker at the Joint Statistical Meetings and Helsinki to speak at a conference in small area estimation, but also taking in Washington, Dublin and Newcastle to visit research colleagues.

Steve and Geoff Jones are completing another poverty-mapping project for the UN World Food Programme, producing small-area estimates of poverty and malnutrition for Nepal for use in aid targeting. They have each spent several weeks in Kathmandu working with staff at the Nepal Central Bureau of Statistics and the local WFP office. The Himalayas did become visible one evening, but the rest of the time were hidden by the monsoon clouds. No signs of Maoist activity in the Kathmandu Valley, but there were a few student demonstrations and road closures to contend with.

Doug Stirling is currently on sabbatical at the University of Reading developing his CAST (Computer Assisted Statistics Teaching) software, in particular adding chapters about multiple regression and multivariate analysis. In September he is running a Workshop in Slovenia at the Applied Statistics 2005 conference.

A large (but not random) sample of Massey PN statisticians attended and presented at the NZSA conference in Otago. Many of us even managed to

return from it eventually, although we suspect a few may still be lost in the fog.

Congratulations to Jonathan Godfrey, who has been appointed to a permanent position as Lecturer in Statistics. Sadly Jonathan will no longer be eligible for the Best Student Presentation prize at the NZSA (or any other) conference, so his long winning streak has finally come to an end.

Mark Bebbington signed himself out of hospital to attend the first Hidden Markov Models and Complex Systems workshop in Wanaka. Apparently the scientific programme just edged the food for accolades, although the fusion cuisine was a little rough on his tender stomach. For his pains (literally) he now finds himself in charge of the programme for the second workshop, scheduled for the less distracting surrounds of downtown Wellington. Mark is also eagerly anticipating the arrival of the new professor to take over his administrative duties, although it is not true that that he is crossing off the days on his calendar.

Chin Diew Lai presented a talk at an invited session "Variance issues in the design of control charts" at the Fourth International Symposium on Business and Industrial Statistics, Palm Cove, Queensland, 13–16 April, 2005. Jonathan Godfrey also attended this symposium.

Dr Ganes S Ganesalingam and Dr Alasdair Noble organised a Palmy Statistician's Forum on Friday 28 October. The Statistics Forum was held in the Russell Room at Wharerata and included 42 participants from IVABS EpiCentre, The Allan Wilson Centre, IFNHH, AgResearch Grasslands, AgResearch Ruakura, HortResearch, Fonterra, Landcare, the Ministry of Social Development, Wellington, the IIST Statistics Group and several postgraduate students from the Massey University campus. Professors Richard Harris (acting HoI, IIST), Jeff Hunter (IIMS, Albany) and Steve Haslett (IIST) opened the forum, welcoming the opportunity to hear and discuss current research amongst scientists and statisticians on the local scene. The keynote speaker, Dr Harold Henderson from AgResearch, Ruakura, suggested a dynamic approach to solving statistical problems, which gave all the participants 'food for thought'. Twelve presentations were given in total and provided much to discuss in the short breaks throughout the day. New links were formed amongst all the participants and the ground set for research collaborations in the future. The prospect of holding this event on an annual basis was also mooted and may provide more positive interaction in future years for the benefit of all.

Geoff Jones

UNIVERSITY OF OTAGO

Department of Mathematics and Statistics

Boris Baeumer received a University of Otago Early Career Award for Distinction in Research. These awards were introduced for the first time in 2004 to recognise the university's most talented early career researchers. There were five successful nominees this year who each received $2000 to help support their respective research programmes. Boris has developed models to describe flow and transport in pourous media. The novel and interdisciplinary nature of his work was recognised in 2003 when he won a Marsden Fast-Start grant, which led to a full Marsden proposal.

We welcomed Dr Mihaly Kovacs to the Department in September. Misi is a Postdoctoral Fellow working with Mark Meerschaert for one year.

The NZSA Annual Conference was held at Salmond Hall from 4–6 July and was a great success. Since the conference and the accommodation were in one place, no one was compelled to get out into the Dunedin mid-winter (which is a beautiful thing). The number of students who entered talks and posters was gratifying. Some participants (nominally, the Young Statisticians) spent an evening playing Laser Strike and having dinner. Tiri Sullivan of Statistics New Zealand won the SPSS Graduate Package. At the conference dinner the next night, music was provided by a local Dunedin Band. Student prizes were awarded by Ray Hoare of HRS. It seemed that everyone had a pretty good time.

David Fletcher left for Europe immediately after the NZSA conference, on conference and study leave. He attended the 25th European Meeting of Statisticians in Oslo, where he bumped into Murray Jorgensen. Murray and David both enjoyed the conference dinner, held at a grand hotel high above the city that was the venue for the talks that eventually lead to the Oslo Peace Accord in the Middle East. David presented a poster on "Model-Averaging in Factorial Experiments". David arrived in London en route to the conference the day after the first bombings in London, and was not sure what to expect on his arrival. All went well for the first half hour, before his laptop bag, containing a computer, passports, tickets, camera and cellphone were whisked away by a modern-day Artful Dodger... quite a welcome in many ways, and a world away from Dunedin! Several days later things had calmed down, and Oslo was a most enjoyable location for a conference. There was talk of many things, including "Sparsity", which seems to be a fruitful area of research for those with minds clever enough to deal with these things, such

as David Donoho of Stanford, one of the invited speakers.

Richard Barker has been in the US on sabbatical for three months, working with Bill Link at the Patuxent Wildlife Research Center on a book about Bayesian inference in statistical ecology.

Jonni Bidwell, John Curran and Dennis McCaughan attended a two-day Group Theory workshop, held in Auckland on 1–2 November as a festschrift for Charles Leedham-Green. The three representatives from the deep South very much enjoyed the proceedings which were organised by Eamonn O'Brien in his own inimitable style. Lots of stimulating talks on group theory, amusing reminiscences from the guest of honour, and a memorable closing dinner: what more could an algebraist want?

The following people are currently visiting or have visited the Department since the last Newsletter.

Linda Hutchison, Department Head/Associate Professor of Secondary Education, University of Wyoming from July 2005–June 2006. Her research interest is Maths Education.

Robert Aldred hosted visits from Professor Akira Saito (Nihon Unversity) looking at forbidden subgraph characterizations for 2-factors and Professor Wal Wallis (Southern Illinois University) looking at some interesting labelling problems for graphs.

David Guichard, Professor of Mathematics at Whitman College, Washington, U.S.A., is visiting the Department from mid-October to December. His areas of interest are Graph Theory and Combinatorics.

Estate Khmaladze, Professor of Statistics at the School of Mathematics Statistics and Computer Science, Victoria University of Wellington, visited on November 11 and 12 and gave two talks.

Seminars

Professor Richard Porter (University of Bristol), "Wave scattering by ice sheets of varying thickness."

Professor Martin Bridson (Imperial College, London, 2005 Forder Lecturer), "The language of symmetry and the grammar of space."

Gareth Vaughan, "Simulating Breaking Waves Using Smoothed Particle Hydrodynamics."

Bill Jackson (Queen Mary, University of London), "Rigidity of Frameworks."

Jeff Miller (Department of Psychology), "Reactive Time Measurements in Cognitive Psychology: Inferences from Probability Distribution Analysis."

Professor James Sneyd (The University of Auckland), "Calcium Oscillations: Using Maths to do Physiology."

Chris Linsell (Dunedin College of Education), "The Role of Activities in Teaching Early Algebra."

Michael Albert (Department of Computer Science), "Playing at Cross Purposes."

Richard Barker, "Advances in Statistical thinking in the late 20th Century."

Coralie Daniel, "Having Blossoms with the Leaves."

Colin Cheyne (Department of Philosophy), "Do Numbers Exist? An Introduction to the Philosophy of Mathematics."

Fourth Year COMO and MATHS Project Presentations

Vivien Challis, "Modelling Flow in the Ross Ice Shelf."

John Irving, "Introduction to Relativistic Quantum Theory."

Scott McCracken, "Sylow Theory."

Mike Paulin (Department of Zoology and Centre for Neuroscience), "Symmetry in motion: mathematical models of agility."

Paul Mullowney (University of Canterbury), "The role of variance in capped-rate stochastic growth models."

Estate Khmaladze (Victoria University of Wellington), "Towards statistical theory of diversity: statistical analysis of large number of rare events (LNRE)."

Estate Khmaladze (Victoria University of Wellington), "Martingale transform goodness of fit tests for general parametric regression."

Lenette Grant

THE UNIVERSITY OF WAIKATO

Department of Mathematics

Now that examination marking is all over and done with, a number of members of the department will be doing some travelling. Kevin Broughan, Ian Hawthorn, Ernie Kalnins, Rua Murray, Tim Stokes, and Stephen Joe will be attending the Mathematics Colloquium in Palmerston North. After the Colloquium, Tim will be flying to Australia to work with his collaborators. Also crossing the Tasman is Ian Craig who will be visiting the University of Sydney for a week towards the end of November. Meanwhile, Sean Oughton and Gabriel Fruit will be attending conferences in the US in early December.

Kevin is still on study leave as is Alfred Sneyd. Alfred is expected back in the country in early December.

At the end of September, Ian H. and Tim attended the 49th Annual Meeting of the Australian Mathematical Society held at the University of Western Australia in Perth. Tim gave a talk titled "Idempotent semiheaps I: restrictive semiheaps" while in a similar vein, Ian presented a talk titled "Idempotent semiheaps II". Before this conference, Tim attended the Twenty Third Victorian Algebra Conference (in Perth!) where he presented a talk on "Enriching Schein's algebra of partial maps".

One of our post-docs, David Pontin, left in early October to take up a position at the University of New Hampshire.

In the first week of October, Stephen had Frances Kuo from the University of New South Wales and Dirk Nuyens from Katholieke Universiteit Leuven as visitors.

Seminars

G. Tee (The University of Auckland), "Sir William Rowan Hamilton (1805–1865, Royal Astronomer of Ireland."

D. Nuyens (Katholieke Universiteit Leuven, Belgium), "On the construction of rank-1 lattice rules."

T. Stokes and I. Hawthorn, "Idempotent semiheaps."

Stephen Joe

Department of Statistics

2005 has seen some quite dramatic changes to the constitution of the Statistics Department at Waikato University. At the end of the first semester we farewelled James Curren who left us to take up a position as Senior Lecturer at Auckland University. His contributions to the departmental teaching and administration, particularly his vast knowledge on the latest happenings in the computer world, are greatly missed. Our loss is definitely their gain. We have also seen the departure of Professor Nye John. Nye announced his retirement at the end of June 2006. In his honour, Ken Russell of the University of Wollongong, NSW, organised a workshop on "Experimental Design" which was held at the end of November, 2005. Nye and Ken have collaborated on many projects over the years. Nye, and his wife Alison, have "retired" to the sunny Marlborough to run a vineyard. We wish them both a very happy retirement. We have also had to farewell our long time departmental assistant, Karen Devoy. In October, Karen left to take up a position as PA to Professor Ian Graham, who was originally in the Computer Science Department and then long time Dean of the School of Computing and Mathematical Sciences, here at the University. He now heads up his own very successful computing company, Endace Technology. Karen has been replaced by Rhonda Robertson who is doing a marvellous job filling the "big shoes" that Karen left.

More than 75 participants, from as far away as Helsinki, took part in our one day workshop, entitled "Data Scrutiny and Data Mining", held in March 2005. We were very privileged to have as the presenter, the NZSA Visiting Lecturer, Professor C R Rao from Penn State University, USA. As most people are aware, Professor Rao, is one of the most eminent statisticians in the world, with a biography that lists two pages of medals, high level appointments, awards, publications and qualifications, spanning six decades. Anyone who has studied statistics will have come across his name. Technical terms such as Cramer-Rao inequality, Rao's Score Test, the Fisher-Rao Theorem and Rao distance appear in all standard books on statistics.

Now, for a little on the "comings and goings" of members of our department. Dave Whitaker returned from leave at the beginning of the second semester and resumed his role of Chairperson of the department. While he was away, he visited Dave Johnson at Loughborough, England. During his time there, they put in the final touches for the second edition of their book, "Statistical Thinking for Managers", which is co-authored with Nye John.

Local News Section continued on page 22...

GEORGE SZEKERES

29 May 1911–28 August 2005

The month of August, 2005 has been a sad one for mathematics in Australia, with the passing of Ren Potts[1] (on 9 August), and George Szekeres. Both mathematicians were closely associated with Adelaide, and many New Zealand mathematicians have had the pleasure of meeting these remarkably creative individuals. Of special note is that both may perhaps be best known for work performed outside their specialist areas, with the Potts model applying to statistical physics (not in Operational Research) and the Kruskal-Szekeres coordinates applying in general relativity (not in combinatorics).

Figure: George and Esther at the Investiture Ceremony for Australian Honours, held at Government House. George Szekeres received his award of Member of the Order of Australia, September, 2002, at the age of 90.

The following notes on George draw heavily from an article for the annual newsletter of the National Mathematics Summer School in 2001 by David Harvey, now studying for a PhD in Harvard. George inspired admiration and optimism from those fortunate to have met him.

George Szekeres was born in Budapest, Hungary, in 1911, and his gifts in science and mathematics were soon apparent. An important influence during his high school career was the journal Kzpiskolai Matematikai s Fizikai Lapok, which provided mathematical problems and enrichment. (George was much later instrumental in establishing a similar high school mathematics journal Parabola in Australia.) George went on to study chemical engineering at the Technological University of Budapest, to contribute to the family's leather business. During his time at university, he often met with a small group of enthusiastic students, drawn from the ranks of the Lapok problem-solvers, to pose mathematical problems and discuss solutions. The group was simmering with talent, including Paul Erdös and Paul Turán, both outstanding mathematicians of this century. Also attending was Esther Klein, who has lectured on geometry at NMSS on two occasions, and whom George would marry in 1937.

[1] see the article (and accompanying photos) by Earnie Tuck on Ren Potts at www.maths.adelaide.edu.au/applied/recent/RenPotts/

Towards the end of the 1930s, life was becoming increasingly difficult for Jews in Hungary. George and Esther eventually found it necessary to leave, and moved to Shanghai, where their son Peter was born in 1940. George worked as a leather chemist there, and later as a clerk in an American air force base. In 1948 George accepted an offer of a lectureship at the University of Adelaide. He remained there for fifteen years, during which time their daughter Judith was born in 1954. In 1963, the family moved to Sydney (except for Peter who was studying physics in London), where George had accepted a position at the University of New South Wales as the Chair of Pure Mathematics on the condition that he would not have to be an administrator. Also in 1963, he was elected to the Australian Academy of Science, and awarded the Academy's Lyle Medal in 1968. George retired in 1976, but continued to work several days a week as Emeritus Professor in the mathematics department at UNSW. In Sydney, George was also a valued member of the amateur classical musical scene, playing violin and viola in the North Sydney Symphony Orchestra and the Ku-ring-gai Philharmonic Orchestra.

George's original mathematical output continued through most of his adult life, beginning even during his undergraduate days. His mathematical interests were incredibly diverse, but there are several recurring themes. One prominent topic is combinatorics, and there is at least one combinatorial problem which has been a thread running through George's whole life. It was first posed by Esther in the early 1930s, and was the subject of a collaborative paper with Paul Erdös (A combinatorial problem in geometry, 1935). Erdös referred to this problem as the 'Happy Ending Problem', because it had a happy ending—namely George and Esther's marriage! The problem has yet to be fully solved, and George continued working on a computer search that would test a particular special case. Besides combinatorial geometry, he also made contributions in the theory of partitions, graph theory, and other areas of combinatorics. He embraced the computer age with enthusiasm, making early contributions to techniques of numerical analysis, especially in the theory of computing high dimensional integrals. His later research interests included combinatorial geometry, Hadamard determinants, and chaos theory.

Despite these wide areas of activity, many applied mathematicians in New Zealand will associate George with yet another area—because of his ground breaking work in general relativity in 1960, when he studied the passage of (hypothetical) observers through the event horizon of a black hole, in his paper "On the singularities of a Riemannian manifold". This original work was also published almost simultaneously and independently by Kruskal, who originally received the credit. However, over time, the contribution of George was recognised, so that today the Kruskal-Szekeres coordinates are widely known.

These coordinates do not follow the passage of an observer, but rather follow the paths of light as it moves into the black hole. The light cone then looks as it does in special relativity, which can greatly facilitate some calculations. A remarkable aspect of these coordinates is that the coordinate singularity in the Schwarzschild metric at the event horizon is now missing in the new line element, but the real singularity at the "origin" of the Schwarzschild metric now splits into two singular surfaces, revealing the presence of two exterior regions. This had been found by Synge in 1950, but the Kruskal-Szekeres coordinates are probably the easiest way to observe this. The classic text, Gravitation, by Misner, Thorne and Wheeler advises students, "One good way for the reader to become conversant with the basic features of the Schwarzschild geometry is to ... carefully reinterpret everything ... in terms of the Kruskal-Szekeres diagram". It seems likely then that George's influence will extend far into the future.

Graham Weir

Local News Section continued...

In April, Dave and also Nye John, presented papers at the 4th International Symposium on Business and Industrial Statistics held in Queensland. After that conference, Nye attended the 55th Session of ISI, held in Sydney. Nye was also an invited speaker at the 24th International Workshop on Matrices and Statistics, held in Auckland at the end of March.

Before James left us, he went to Tempe, Arizona, where he was an invited speaker at the 6th International Conference on Forensic Statistics. In June, he went to Sitges, Spain, where he had been invited to give a day long workshop on the statistical evaluation of multivariate trace evidence. Bill Bolstad attended the American Statistical Association meeting held in Minneapolis, Minnesota, where he gave a paper. Murray Jorgensen also attended 55th Session of ISI, held in Sydney, in March and in July, he was an invited contributor at the Satellite meeting on Hidden Markov Models, held in Wanaka, prior to attending the NZSA 2005 meeting in Dunedin. Judi McWhirter also attended this conference. At the AGM, held at the conference, Murray was re-elected as President of the Society and Judi was re-elected Secretary. Currently, Murray is on sabbatical. Since going on leave, Murray has given a contributed paper at the European Meeting of Statisticians held in Oslo, visiting Bill Reed at the University of Victoria in British Columbia, en route. He has also visited Queensland, where he was working with Geoff McLaughlin.

Seminars

Lyn Hunt, "Using multiple choice questions as an assessment device for statistical thinking."

David Whitaker, "The state of the art in the generation of efficient statistical designs."

Rosemary Bailey (Queen Mary University of London), "Hasse diagrams to describe the structure of designed experiments."

Nye John, "Design, GenStat and CycDesigN."

Peter Mullins (Sage Consultants Ltd), "Using Excel for inspecting segments of a time series of reasonable length."

Beatix Jones (Institute of Information and Mathematical Sciences, Massey University, Albany Campus, Auckland), "Fitting and interpreting sparse Gaussian graphical models for high dimensional data."

Chris Triggs (Department of Statistics, The University of Auckland), "Establishing Identity."

Michael Stuart (Trinity College, Dublin), "Mathematical thinking versus statistical thinking; redressing the balance in statistical teaching."

Claire Jordan (Institute of Information and Mathematical Sciences, Massey University, Albany Campus, Auckland), "CART, PPM's and PBRF."

George Styan (McGill University, Montreal), "Issai Schur (1875-1941) and the early development of the Schur complement, S-RP-1Q: photographs, documents and biographical remarks."

Daniel Walsh (Institute of Information and Mathematical Sciences, Massey University, Albany Campus, Auckland), "The Importance Sampling Hough Transform."

Judi McWhirter

VICTORIA UNIVERSITY OF WELLINGTON

School of Mathematics, Statistics and Computing Sciences, *Te Kura Tatau*

Enrolments in Mathematics are levelling out after a 30% drop over the past three years. Our academic numbers are now down to just nine tenured positions in Mathematics, with currently just over 1 position of contracted semi-retired academics. Many years ago we had fourteen tenured positions.

Our student/staff ratio is about 18:1 at present. We will possibly appoint one new tenured mathematician next year, but the finances do not look good for any more appointments to replace the significant recent drop in tenured mathematicians at Vic.

Mathematics, Statistics and Operations Research were reviewed in August this year, as part of Vics routine academic programme review timetable. We were commended for a very thorough and searching self-review, and Mathematics at Vic was praised for the excellence of its research programme. The review was more directed at our teaching programmes, however, and made some suggestions for how to improve the number of students enrolling in Mathematics at Vic. This was a response to our expressed concerns about falling

numbers of tenured academics, and how the financial system in place at Vic seems to mediate against making the new appointments we feel are needed.

The review also noted that our workloads seemed inordinately high (averaging over 9 contact hours per week during term time), and suggested we review our tutorial and assessment practices with a view to reducing staff workload. Overall it was a very positive review with many nice things to say about the teaching of mathematics at Vic.

Ken Pledger retired early this year, and was soon re-hired on contract to teach geometry and algebra. Philip Rhodes-Robinson has also retired this year, and is now back on contract, teaching calculus and mathematical modelling. Lindsay Johnston continues on contract, teaching calculus and mathematical modelling, and our summer course Introductory Algebra. Geoff Whittle will take up a McLaurin Fellowship in July next year, releasing him from teaching duties for a full year. Yinhuo Zhang takes Research and Study Leave next year too.

Peter Donelan is currently on Research and Study leave (and trying to get used to a French keyboard...). After attending the Australian Mathematical Society Annual Conference, he have visited Jon Selig at London South Bank University. Currently he is with Jean-Pierre Merlet at INRIA, Sophia Antipolis in France, before also visiting Clement Gosselin at University of Laval, Quebec.

We had visits from several statisticians:

- Professor Albert Shiryaev (this is a fact, his true name, not a rumour), one of the best contemporary specialists in stochastic analysis and financial mathematics (and this is rumour, but very widely spread) visited in July-August and gave a public lecture and a sequence of four seminar talks.
- Professor Robert Liptser form Jerusalem Technical University visited for a week in June.
- Professor V.S. Mandrekar from Michigan State University paid us a short visit at the beginning of August.

Yu Laing has left us for a one year postdoc in the National University of Singapore, and then to a permamant position at Nanjing University in 2006. Guohua Wu has a tenure track position at Nanyang Technological University.

Rod Downey delivered 5 tutorial lectures for the Institute of Mathematics National University of Singapore as part of their thematic program Computational Prospects of Infinity. He also organized and attended the Dagstuhl meeting on parameterized complexity, and is invited to give a 45 minute talk at the next ICM in Madrid.

Rebecca Weber is visiting Rod from Dartmouth for a short term postdoc, and Noam Greenberg from Cornell and Notre dame arrives for a year long postdoc in August.

Rob Goldblatt gave the opening plenary address at the conference *Algebraic and Topological Methods in Non-Classical Logics* in Barcelona in June.

Mark McGuinness visited Oxford again this year for a couple of weeks, to work on cardiac control models with Andrew Fowler. He also spent two months at the Korea Advanced Institute for Science and Technology in Taejon, South Korea, towards the end of the year, teaching and researching in applied maths.

Seminars

Carl Bender (Washington University in Saint Louis), "Ghost busting—making sense of non-Hermitian Hamiltonians."

Faith Fich (Univeristy of Toronto), "How hard is it to take a snapshot?"

Mark Moir (Sun Microsystems), "Obstruction-free algorithms can be practically wait-free."

Antonija Mitrovic (Canterbury University), "Constraint-based tutors: theoretical foundations, development."

Xiaogu Zheng (NIWA), "A mixture model for simulation of precipitation in the upper Waitaki catchment, New Zealand, and its relation with interdecadal pacific sscillation."

Carl Wieman (2001 Nobel Prize for Physics, JILA and University of Boulder, Colorado), "Teaching physics."

Zbigniew Michalewicz (Adelaide), "Adaptive business intelligence."

Paul Mullowney (Christchurch), "The role of variance in capped-rate stochastic growth models."

Paul Malcolm (Canberra), "Parameter estimation for asset-price evolution dynamics via M-ary detection."

Mike Paulin (University of Otago), "The neural particle filter: a model of neural computations for dynamical state estimation in the brain."

Hans van Ditmarsch (University of Otago), "Belief change and dynamic logic."

Dr Antonija Mitrovic (Canterbury University), "Constraint-based tutors: theoretical foundations and development."

David Bryant (Department of Mathematics/NZ Institute of Bioinformatics, The University of Auckland), "Continuous and (mostly) tractable models for the variation of evolutionary rates."

Malcolm Longair (Cavendish Laboratory, Cambridge University), "Astrophysics and cosmology of the 21st century."

Jin Seo Cho, "Testing for unobserved heterogeneity in Weibull and exponential duration models."

Philippe Kruchten (University of British Colombia), "Software architecture knowledge and design decision."

Mark McGuinness

THE CRAWLER

At Massey we talk of nothing but PBRF. Publishing in good journals is good for PBRF. *Annals of Mathematics* is supposed to be a good journal. It has the highest 20-year impact of any maths journal, and its editors, although limited to a one mile radius of Fine Hall, are no slouches. As far as I can determine (Math Reviews only began listing institutions in 1982), the only New Zealand-based mathematician to have published in the *Annals* is Peter Fenton, whose first paper *Some results of Wiman–Valiron type for integral functions of finite lower order* (Ann. Math. **103** (1976), 237–252) appeared there in the same year he joined Otago. All in all I think I can say that this is not a good effort. How about it, fellow mathematicians?

Fortunately, expats are busy keeping up our name. One in particular. A quick search on Web of Science (not properly a subject for the Crawler, since it is far from free, but Massey has just extended its sub back to 1945) reveals that Vaughan Jones's 1987 *Annals* paper *Hecke algebra representations of braid-groups and link polynomials* (Ann. Math. **126** (1987), 335–388) is the most-cited Annals paper since 1968. It has 413 citations. (In 1968 it's eclipsed by Atiyah and Singer's *Index of elliptic operators III*, 620 citations.) Vaughan comments:

> I think the reasons for the success are twofold. One is that the subject underwent a spectacular burst of popularity at the time of the paper, which was sustained for several years. The work also made connections with several areas like quantum field theory and statistical mechanics, and my paper contained several of the basic results. A whole new direction has been developed in the last five years called Khovanov homology which interprets the polynomial invariants as Euler characteristics of complexes whose homology groups are themselves invariants. So perhaps I can catch up to Atiyah and Singer eventually...
>
> The other reason for the success of this particular paper is that I dared to write a comprehensible article in the Annals. There is really only one really technical part so it's a paper people could actually read and learn something from.

Robert McLachlan

FEATURES

NEW ZEALAND INSTITUTE OF MATHEMATICS AND ITS APPLICATIONS (NZIMA)

This is an update on the NZIMA for the NZMS Newsletter. We hope that members of the NZMS have benefitted and will continue to benefit from the NZIMA's activities, following its establishment as one of the first five CoREs in 2002.

NZIMA programmes

Three programmes have commenced in 2005:

- Mathematical Models for Optimizing Transportation Services
  Directors: Matthias Ehrgott, Andy Philpott, David Ryan (The University of Auckland)

- Hidden Markov Models and Complex Systems,
  Director: David Vere-Jones (Victoria University of Wellington, and Statistics Research Associates)
- Geometric Methods in the Topology of 3-Dimensional Manifolds,
  Directors: David Gauld (The University of Auckland), Roger Fenn (University of Sussex) and Vaughan Jones (The University of Auckland and University of California Berkeley).

Two new programmes will commence in 2006/07, as follows:

- Modelling Invasive Species and Weed Impact,
  Directors: Jennifer Brown, Alex James and David Wall (University of Canterbury) proposed to start late 2006 or early 2007
- Partial Differential Equations: Applications, Analysis and Inverse Problems,
  Directors: Colin Fox, Mike Meylan, Boris Pavlov (The University of Auckland), proposed to start in the second half of 2006.

Maclaurin Fellows

This year's Maclaurin Fellow has been Professor Robert McLachlan (Massey University), pursuing his research on geometric integration.

Next year's Maclaurin Fellow will be Professor Geoff Whittle (Victoria University of Wellington), who will use his Fellowship to spend time tackling Rota's conjecture and the well-quasi-ordering conjecture for matroids.

Visiting Maclaurin Fellows for 2005 include Professors Hyman Bass (Michigan), Jonathan Borwein (Dalhousie), John Conway (Princeton), and Martin Liebeck (London).

Renewal of CoRE Funding

In early September we were very pleased to learn that the NZIMA's Centres of Research Excellence (CoRE) funding has been renewed through to 2008, following a positive review by the Tertiary Education Commission (TEC). At the same time, the New Zealand government announced that all seven CoREs would be reviewed again in 2006, with the aim of extending CoRE funding for successful centres through to 2014/15 (and offering three years of 'phase-down' funding for any that are unsuccessful).

This year's review complimented the NZIMA on its achievements to date, especially the high quality of our research programmes and record, the strength of our international linkages, governance and management, and encouragement of students. Also it recommended that we take further

steps to build up the profile of the NZIMA and develop a longer term vision and identity, in order to enhance the NZIMA's sustainability. We will be taking up these recommendations in the coming months.

Establishment of Pacific Rim Mathematical Association

Marston Conder took part in a Pacific Rim Mathematical Forum at the Banff International Research Station (BIRS) in October 2005, at the invitation of the directors of the MSRI (Berkeley) and PIMS (Canada). There he gave a short presentation on the NZIMA, and also had helpful discussions with representatives of AIM (the American Institute of Mathematics), AMSI (the Australian Mathematical Sciences Institute), IMS (the Institute of Mathematical Sciences in Singapore) and PIMS.

A principal outcome of the meeting was a decision to establish a Pacific Rim Mathematical Association (otherwise known as 'PRIMA'), with the aim of promoting and facilitating the development of the mathematical sciences throughout the Pacific Rim region. It is intended that this will involve improved networking, coordination of activities, training (e.g. summer schools), infrastructural assistance, sharing of expertise, pooling of resources etc. The NZIMA will be joining this association, and Marston Conder has been invited to join the Liaison Committee.

Further details of the NZIMA's activities and opportunities for the future can be found on the NZIMA's website

http://www.nzima.auckland.ac.nz

Marston Conder
Vaughan Jones

MINUTES

Provisional Minutes of the 31st Annual General Meeting of the New Zealand Mathematical Society
12.30 pm, Wednesday 7 December 2005
AH2, Massey University, Palmerston North

Present. Graeme Wake (Chair), Winston Sweatman, Shaun Hendy, Tammy Smith, Aroon Parshotam, Kee Teo, Stephen Joe, Peter Kelly, Kevin Broughan, Graham Weir, David Wall, Eamonn O'Brien, Ken Pledger, David Gauld, Charles Little, Robert McLachlan, Garry Tee, Alona Ben-Tal, Igor Boglaev, Carlo Laing, Gillian Thornley.

Winston Sweatman opened the meeting. It was moved (Hendy and Thornley) that in the absence of the President and Vice-President, Graeme Wake as former President would chair the meeting. The motion was carried.

1. **Apologies.**

   Apologies were received from Mick Roberts, Gaven Martin, Charles Semple, Warren Moors, Michael Albert, Robert McKibbin, Marston Conder and John Butcher.

2. **Minutes of 30th Annual General Meeting.**

   It was moved (Wake, Smith) that the minutes of the 30th Annual General Meeting of the NZMS be accepted. The motion was carried.

3. **Matters arising from the minutes** (numbers refer to items of the 30th Annual General Meeting).

   8 The issue of long waiting time for publication in the NZJM was again raised. This is addressed in item [9].

   11 It was reported that Council had investigated the cost and possible form of a research medal. Council supports the idea and has approached the NZIMA for possible funding. It has been indicated that the NZIMA is eager to support the medal in some way. For example, they may help fund a New Zealand tour by the medal winner. Further discussions are to be held between the Council and the NZIMA. It is hoped that something will be in place for next year.

4. **Presidents report.**

   (a) The report was delivered to the meeting and will appear in the NZMS newsletter.

   (b) It was moved (Wake, Smith) the report be accepted. The motion was carried.

5. **Treasurer's report.**

   (a) The Treasurer's report was delivered to the meeting and the financial statements and auditor's report were distributed to the members.

   (b) The Treasurer noted a problem with unpaid subscriptions. She also asked members present to actively promote new members. Subscriptions cover the operating costs of the Society while the travel fund is being used to build up an endownment. In response to a question the Treasurer confirmed that grants and awards are funded from interest generated from the Society's funds. It was noted that the total balance of net assets of $ 184 900 had increased by about $ 60 000 over the last 10 years.

   It was suggested that one way to build up funds was by small bequests and perhaps a draft codicil could be included in the newsletter. These ideas were refered to the Council for consideration.

   (c) It was moved (Smith, Hendy) that the statements be accepted. The motion was carried.

6. **Membership Secretary's report and annual subscriptions.**

   A report from the Membership Secretary, John Shanks, was presented. It was noted that membership was slightly down. It was moved (Wake, Smith) that the report be accepted. The motion was carried.

   The drop in membership was considered. It was felt that further encouragement was needed. It was suggested that Heads of Departments could ask for nominations for new society members (staff and students) at the beginning of the year.

   Council had recommended that subscriptions be fixed at current levels ($36 ordinary member, $18 reciprocal, $18 overseas student and $7.60 student). It was moved that subscriptions be fixed at current levels (Smith, Hendy). The meeting approved.

   It was suggested that Council could consider the possibility of larger discounts for early payment of subscriptions.

   The Treasurer also informed the meeting that the Membership Secretary was investigating other ways in which subscriptions could be paid.

7. **Election of Coucillors.**

   Gaven Martin takes over as NZMS President with the outgoing President Mick Roberts remaining on Council as Vice-President for a year. The terms of office of Tammy Smith and Charles Semple have ended. Tammy Smith has been renominated for a second term and Rick Beatson (University of Canterbury) has also been nominated. Both were elected unopposed.

8. **Appointment of auditors.**

   It was moved (Wake, Thornley) 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.

9. **New Zealand Journal of Mathematics.**

   David Gauld reported to the meeting that he had taken over mid-year from David Alcorn as chair of the NZJM Committee. He said that the Committee was currently reviewing the membership of the Editorial Board. They were aiming to increase the speed and quality of publication. Electronic publication was also being considered.

   The meeting encouraged the NZJM committee and editor in their consideration of processes leading to faster publication. It was suggested that perhaps the process beyond acceptance could be fast-tracked for NZMS members.

   It was noted that Gaven Martin is the NZJM Editor as well as incoming NZMS President and so is well-placed for these issues.

   David Gauld was thanked for his report.

10. **NZMS Visiting Lecturer 2006.**

    This is still being arranged. The meeting was informed that Mike Steel had been approached and that he had also suggested his visitor Daniel Huson. It may be possible to combine these two.

11. **General Business.**

    (a) Robert McLachlan was thanked for his service as Editor of the NZMS Newsletter. Mark McGuinness has been appointed as new Editor.

    (b) The meeting congratulated Mick Roberts on his personal chair at Massey University.

    (c) The meeting thanked Charles Semple for his two terms on council and Mick Roberts for his two years as President.

The meeting closed at 1pm.

BOOK REVIEWS

PUBLICATIONS

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

Bruce van Brunt
Institute of Fundamental Sciences
Massey University
(email: B.vanBrunt@massey.ac.nz)

SPRINGER-VERLAG PUBLICATIONS

Back, K, A Course in Derivative Securities – Introduction to Theory and Computation. (Springer Finance) 355pp.

Crandall, R, Prime Numbers – A Computational Perspective, 600pp.

Crossley, MD, Essential Topology. (Springer Undergraduate Mathematics Series) 224pp.

Cull, P, Difference Equations – From Rabbits to Chaos. (Undergraduate Texts in Mathematics) 394pp.

Manin, Yu I, Introduction to Modern Number Theory – Fundamental Problems, Ideas and Theories. (Encyclopaedia of Mathematical Sciences) 514pp.

Miller, E, Combinatorial Commutative Algebra, 426pp.

Runde, V, A Taste of Topology. (Universitext) 182pp.

Shreve, SE, Stochastic Calculus for Finance I – The Binomial Asset Pricing Model, 192pp.

Stroock, DW, An Introduction to Markov Processes, 171pp.

Zhu, K, Spaces of Holomorphic Functions in the Unit Ball. (Graduate Texts in Mathematics) 268pp.

CONFERENCES

Conferences in 2006

9–13 January 2006, **International Symposium on Fractional Calculus** (20 international speakers).
website: http://www.maths.otago.ac.nz/~bbaeumer/symposium.htm

8–15 January 2006, at Taipa, Northland: **NZMRI Workshop on Geometric Methods in the Topology of 3-Dimensional Manifolds**.
website: http://www.math.auckland.ac.nz/Events/2006/SummerWorkshop/

30 January–3 February 2006, at Albany, Auckland: **Mathematics in Industry Study Group (MISG 2006)**.
website: http://misg2006.massey.ac.nz

5–9 February 2006, at the Alzburg Inn Resort, Mansfield, Victoria, Australia: **Annual conference of Australian and New Zealand Industrial and Applied Mathematics (ANZIAM 2006)**.
website: http://www.maths.monash.edu.au/anziam06/

12–16 February 2006, in Auckland: **Third International Conference on Ethnomathematics**.
website: http://www.math.auckland.ac.nz/Events/2006/ICEM-3/

5–8 June 2006, University of Brunei Darussalam, Brunei (Borneo): **International Conference on Mathematical Modelling and Computation**.
email: Seminar Secretariat, Dr Malcolm Anderson
mmc06@fos.ubd.edu.bn
website: http://www.ubd.edu.bn/news/conferences/fosmmc06/

3–7 July 2006, at Sky City, Auckland: **ASC/NZSA 2006—Australian Statistical Conference/New Zealand Statistical Association Conference**.
website: http://www.statsnz2006.com

REPORT ON THE 2005 NEW ZEALAND MATHEMATICS COLLOQUIUM PALMERSTON NORTH, 5–7 December 2005

The Colloquia began in 1966, making this year's event (counting five years in which, instead, an Australasian Mathematics Convention was held in Australia or New Zealand) number 40. Some participants have been present at nearly every one! Despite some debate at last year's meeting about the continued role of the Colloquium, another successful event has been run attracting 111 delegates. It was particularly good to see 6 people from Otago, which must be a modern day record for a North Island Colloquium! (Victoria—best not mentioned.)

The NZMC invited speakers were

Professor Peter Kuchment, Texas A&M University, *Circular Radon transform, nodal lines, thermal acoustic tomography, and all that.*

Tatiana Márquez Lago, University of New Mexico, Butcher Prizewinner, *Stochastic variation estimates of progesterone transcriptional activity in the EGFR pathway.*

Professor Mark Meerschaert, Otago University, ANZIAM Speaker, *Vector fractional calculus.*

Associate Professor Eamonn O'Brien, University of Auckland, NZMS Speaker and 2004 NZMS Research Award winner, *Algorithmic approaches to the study of linear groups.*

Associate Professor Bruce van-Brunt, Massey University, *Complex functional differential equations.*

An innovation this year was the talk by Tatiana Márquez Lago, the inaugural winner of the John Butcher Award in Numerical Analysis. After completing undergraduate degrees in Mexico, Tatiana gained an M.Sc. in Mathematics at Simon Fraser University. She began her PhD at McGill University in the Department of Mathematics in conjunction with the Centre for Nonlinear Dynamics in Physiology and Medicine, and then transferred to the University of New Mexico where she is working under the supervision of Dr Stanly Steinberg. The John Butcher Award in Numerical Analysis was established to recognise John's long and productive career in numerical analysis, and in particular in the numerical solution of ordinary differential equations. In keeping with John's consistent encouragement of students, the award is for the best student talk at SciCADE, considering both the academic merit of the content and the presentation itself. This year, thanks to a grant from the NZIMA, the winner was able to visit New Zealand to speak at the Colloquium.

In addition to the 5 invited speakers there were 54 contributed talks. There were also two special streams, a Mathematics Education stream on Monday afternoon and a Dynamical Systems stream on Monday. The latter included an invited lecture by **Dr Lennaert van Veen**, La Trobe University, on *"Periodic motion vs. turbulent motion: scaling laws, bursting, and Lyapunov spectra*. In fact this stream proved so popular that the talks had to be spread over all three days and several sessions. Powerpoint continued its inexorable rise with only a few diehards holding out on the OHP. For the first time I didn't see a single chalk talk. Sic transit gloria.

A well catered and enjoyable dinner was held at the Institute of Rugby building on Tuesday night. Here the Aitken Prize was awarded. The judges remarked on the high standard of this year's student talks, and although I know judges say that sort of thing every year, in this case I concur. **Sharlene Harper** (Massey University) was awarded Honourable Mention for her talk *Transport of individual droplets sprayed from a line or point source*; **Dion O'Neale** (Massey University) was awarded Honourable Mention for his talk *Geometric integration for a two spin system*; and the Aitken Prize was awarded jointly to **Elan Gin** (University of Auckland) for her talk *Calcium waves and buffers* and to **Amanda Elvin** (Massey University) for her talk *The role of gap junctions in a neural field model*. Congratulations to all.

Enjoyable excursions were made on Tuesday afternoon to Cross Hills Gardens to see the rhododendrons, and to walk the Manawatu Gorge. Since 25mm of rain fell on Monday, and another 13mm between 9 and 12 on Tuesday morning, there was some concern about the conditions, but in the event the rain held off and David Gauld's feet obtained excellent traction in the mud.

I'd like to thank the chairs of the organizing committee, **Dean Halford** and **Charles Little** for doing such a thorough job. Next year's colloquium will be 4–6 December at the University of Waikato.

Robert McLachlan

NOTICES

NEW ZEALAND MATHEMATICAL SOCIETY
President's Report 2005

This report covers the period from the AGM in December 2004 in Dunedin to December 2005.

At the colloquium dinner in Dunedin in 2004 the society awarded honorary memberships of the NZMS to: **Marston Conder, Rob Goldblatt, Gillian Thornley** and **Graeme Wake** in recognition of their service to the society over many years. In addition, the NZMS council has made **John Shanks**, our long-serving membership secretary an honorary member. My congratulations to all five, and my thanks for their contribution to NZMS.

The **Forder Lecturer** for 2005 was **Professor Martin Bridson** of Imperial College London. His talks were well-received with excellent reports from all who attended. Professor Bridson is to be congratulated on his achievement. His visit was coordinated by Gaven Martin, who also went to considerable lengths to make Martin and his family welcome in New Zealand. Thank you Gaven.

Two **NZMS Research Awards** for 2005 were presented at the RSNZ Science Honours Dinner in Wellington: to **Robert McLachlan** of Massey University "for creative, pioneering work leading to deep advances in the theory of geometric numerical integration, and its application in the study of dynamical systems"; and to **James Sneyd** of The University of Auckland "for extensive and celebrated contributions in mathematical biology, demonstrating approaches that combine originality with biological realism." My thanks go to the committee: Mike Steel, Geoff Whittle and Graham Weir. The winner of the Research Award for 2004, **Eamonn O'Brien** of The University of Auckland, is to be the NZMS speaker at the 2005 colloquium.

I would like to welcome two new **Fellows of the NZMS**: Igor Boglaev and Kee Teo, both of Massey University in Palmerson North. My thanks to the selection committee, who were Derek Holton, Rob Goldblatt and Graeme Wake.

The **Aitken Prize** for the best student talk at the 2004 colloquium was awarded to **Joanne Mann**, a graduate student at Massey University (Albany) working under the supervision of Mick Roberts, for her talk 'To vaccinate or not to vaccinate?'.

The NZMS supported a speaker at the **International Workshop on Matrices in Statistics, 2005**, held at Albany. The keynote address on 'Coefficients of ergodicity in a matrix setting' was presented by **Professor Eugene Seneta** of the School of Mathematics and Statistics at the University of Sydney. Another meeting supported by the NZMS was the 2005 **Mathematics in Industry Study Group**, organized by Graeme Wake at Albany. The society contributed towards the participation of students at the meeting.

Congratulations to our members:

- James Sneyd on being elected a Fellow of the Royal Society of New Zealand;
- Robert McLachlan for being awarded the Individual Researcher Award from Massey University;
- Jeff Hunter on being awarded a D.Sc. by Massey University.

My thanks go to Charles Semple who is stepping down from council, and to Tammy Smith who is due to step down as treasurer, but has indicated her willingness to be reappointed. Thank you too, to Robert McLachlan for editing the newsletter from 2000 to 2005. Many thanks also to the other council members who have supported me in my second year as president, and the numerous others who have provided help and information. My term has now come to an end, and I wish my successor Gaven Martin the best for his term as president.

Mick Roberts
President, New Zealand Mathematical Society
Institute of Information and Mathematical Sciences,
Massey University, Albany

ELECTION OF THREE MATHEMATICAL SCIENTISTS AS FELLOWS OF THE ROYAL SOCIETY OF NEW ZEALAND

Dr **John S. Buckleton**, Principal Scientist, Environment and Scientific Research (ESR), has an outstanding international reputation in the analysis and interpretation of forensic evidence. He is an author of more than 100 significant publications or patents, largely in the forensic field (shoeprints, firearms, DNA, blood grouping, tool marks, fire debris analysis, glass and paint). His monograph, The forensic interpretation of glass evidence (2000) has been adopted as the standard text by many countries.

John Buckleton has been a key scientist in establishing New Zealand's reputation at the forefront internationally of the application of DNA-based methods for the matching of forensic samples to archived records in databases. In collaboration with statistician Professor C. M. Triggs and others, he developed, applied and refined analytical methods for DNA profiling used in New Zealand from the 1980s to the present. His co-authored monograph, Forensic DNA evidence interpretation, was published this year (2005).

John Buckleton is regularly called upon to appear as an expert witness in New Zealand courts and has appeared as an expert witness in several courts overseas. He is a research consultant to advisory bodies in several countries and is in wide demand as a leader of training workshops on evidence interpretation in New Zealand, Australia, England, Europe, Asia and the USA.

Professor **Bakhadyr M. Khoussainov**, Department of Computer Science, The University of Auckland, is a leading expert in the area of logic and theoretical computer science. His work involves deep and exceptionally broad studies into computability and complexity theory. Computability theory is concerned with the extent to which mathematics can be implemented on a machine, and complexity theory is concerned with delineating the resources (running time, memory, etc) needed for processes that can be implemented. He works with world leaders in logic in the USA, Russia and New Zealand and has received international acclaim for his ideas, ingenuity and exceptional technical brilliance, particularly in the area of "automatic structures"—mathematical structures where the basic operations are implemented by finite state automata.

Bakhadyr Khoussainov's research has been supported by Fellowships from the von Humboldt Foundation, the Japan Society for Promotion of Science, and the Marsden Fund. His research publications include one book and more than 90 papers. Since his arrival in New Zealand in 1996, he has given more than 75 seminars and invited talks at prestigious international gatherings including the European Logic Colloquium (2002) and Asian Logic Symposium (2002). His excellence in teaching and research has been recognised by a University of Auckland Distinguished Teaching Award, and the New Zealand Mathematical Society's Research Award (2002).

Professor **A. James Sneyd**, Professor of Applied Mathematics, The University of Auckland, is one of the world's leading mathematical biologists. His substantial international reputation rests on his basic research into pattern formation and self-organisation in biological systems and a study of the subcellular calcium dynamics involved in cell signalling in a variety of cell types. With over 50 research publications, many in top-ranked journals in mathematical biology, he has established himself as a world leader in these fields. For example, in elegant mathematical models he has shown how the formation of the complex patterns in honey and pollen observed in honeycomb can be explained by some very simple rules; his research has also led the development of control strategies for the tropical disease, leishmaniasis. However, he is probably most widely known for his influential research-based textbooks, Self-organisation in Biological Systems (2001) and Mathematical Physiology (1998), both of which have won Best Book awards from the American Association of Publishers.

James Sneyd is one of the very few mathematicians to have won research grants from the American National Institute of Health. His modelling is characterised by ingenuity, technical prowess and a clear understanding of biological phenomena at an appropriate level of detail.

A SCHOLARSHIP FOR A MASTERS STUDENT
at the Institute of Information and Mathematical Sciences, Massey University, Auckland

A Masters student is sought to study a puzzling phenomenon called Cheyne-Stokes Respiration (CSR). CSR is a weird type of breathing where a person experiences cycles of increasing followed by decreasing ventilation, followed by periods of breath-holding. It is usually seen during sleep, in healthy people at high altitude, in people with heart failure in people with neurological disorders and in infants. The aim of the project is to explain the mechanism that leads to the appearance of Cheyne-Stokes Respiration by studying nonlinear differential equations. This is truly a multi-disciplinary project that involves mathematical modelling, mathematical analysis and computer simulations.

Applicants should have strong undergraduate training in applied mathematics and a good background in computing. A good knowledge in nonlinear dynamics and a background in physiology will be an advantage.

Salary: $16,000 pa scholarship (tax free) for two years + domestic fees. Other scholarships can be held concurrently.

For more information contact: Dr Alona Ben-Tal, Institute of Information and Mathematical Sciences, Massey University, Auckland. E-mail: `a.ben-tal@massey.ac.nz`, Phone: 09-4140800 ext. 41050, Fax: 09-4418136.

DOCTOR OF SCIENCE AWARDED TO JEFF HUNTER

Professor Jeff Hunter received the highest of science degrees when he became a Doctor of Science at Massey Universitys recent graduation ceremonies in Auckland.

Professor Hunter is the Professor of Statistics within the Institute of Information and Mathematical Sciences (IIMS). His specialisation is in applied probability, a branch of mathematics that involves the use of probability concepts and methods to model random phenomena. The Doctor of Science degree has been conferred for his work in this area, in which he has published more than 40 sole-authored scientific papers in international journals. He is author of the two-volume book Mathematical Techniques of Applied Probability published by Academic Press in 1983. In 2003 he was awarded a New Zealand Science and Technology Bronze Medal for his contributions to the mathematical and information sciences.

Professor Hunter was awarded his Master of Science degree with first class honours in Mathematics from the University of Auckland in 1963 and his Doctor of Philosophy in Statistics from the University of North Carolina at Chapel Hill in 1968. Professor Hunter was at the University of Auckland until he came to Massey in 1990. He was the foundation Head of the Department of Statistics and foundation Head of IIMS at the Albany campus.Professor Hunter retires in June. He will continue working at the University on a part time basis.

HONORARY DOCTOR OF SCIENCE AWARDED TO SHAYLE SEARLE

Few people could envisage making a career out of proving that applied mathematical statistics is not an oxymoron, but a valuable area of statistics. Professor Shayle Searle managed this feat through an early and continued interest in translating applied problems into solvable mathematical formulations.

In 1950 he completed a Master of Arts with First Class Honours in Mathematics at Victoria University College followed, in 1953, by a postgraduate diploma in mathematical statistics at Cambridge University. He returned to New Zealand to work as a research statistician at the New Zealand Dairy Board, during which time he was awarded a Fulbright Travel Award, which enabled him to enrol in a PhD in Animal Breeding at Cornell University.

After completing his PhD, he continued working at the New Zealand Dairy Board until 1962, when he was invited back to Cornell as a statistical consultant for the university's computer centre. By 1970, he had attained the rank of professor and remained at Cornell University until his retirement in 1995 when he was appointed Professor Emeritus of Biological Statistics.

One of Professor Searle's earliest contributions to his field was to bring the power of matrix algebra to bear on the multivariate statistical analysis developed in the 1950s to analyse the inheritance of animal characteristics. At the time, these calculations were well beyond the power of computers. He provided proof of a formula that enabled direct computation of the huge number of genetic variations underlying observable differences of animal characteristics.

He developed formulae so that estimates based on field data, rather than data from controlled experiments, were not biased by different sizes of data sets. These formulae have been implemented in one of the most widely used commercial statistical software packages, SAS.

During his academic career Professor Searle wrote eight textbooks that are widely regarded for their clarity and comprehensiveness. He also served as an associate editor for Biometrics, on the Editorial Board of the Biometric Society (International), and as a member of the International Biometric Society (ENAR). In 1985 he was awarded the US Senior Scientist Award by the Alexander von Humboldt Foundation.

Professor Searle has a long-standing association with Victoria University. In 2003 he established a Visiting Fellowship in Statistics to enable leading international statisticians to visit, research and present seminars. An active member of the US Friends of Victoria, he endowed a prize in first-year applied statistics, which has been awarded since 1999.

HAMILTON MEMORIAL PRIZE

The 2005 Hamilton Memorial Prize has been awarded to Dr **Barbara Holland**, Allan Wilson Centre at Massey University for her pioneering mathematical research in evolutionary biology, including the development of new instruments for phylogenetic network representation. The prize recognizes her achievements in the conception and application of sophisticated mathematical and statistical techniques to evolutionary biology, especially in the representation of phylogenetic networks and trees. (A phylogenetic tree is a graphical means to depict the evolutionary relationships of a group of organisms.) With her solid background in operations research, Dr Holland has developed novel tools for representing the conflicting information that arises in many studies of evolutionary relationships, where a large collection of phylogenetic trees occurs as opposed to a single tree.

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Application for membership of the NZMS

The New Zealand Mathematical Society (Inc.) is the representative body of professional mathematicians in New Zealand, and was founded in 1974. Its aims include promotion of research in the mathematical sciences, the development, application and dissemination of mathematical knowledge within New Zealand, and effective cooperation and collaboration between mathematicians and their colleagues in New Zealand and in other countries.

Membership categories:

(Full details at www.math.waikato.ac.nz/NZMS/NZMS.html)

Ordinary*	\$36 p.a.	
Reciprocal	\$18 p.a.	

For overseas residents who are fully paid-up members of societies with which the NZMS maintains a reciprocity agreement (including the American Mathematical Society, the Australian Mathematical Society, the Canadian Mathematical Society, the London Mathematical Society, and the Mathematical Society of Japan).

Student*	\$7.60 p.a.	For currently enrolled students in NZ
Overseas student	\$18 p.a.	For currently enrolled students in overseas

(GST is added to rates for NZ residents.)

Members can subscribe to the New Zealand Journal of Mathematics (http://www.math.auckland.ac.nz/NZJM/index.html) at a reduced rate.

Members can also elect to make a donation, when paying their subs, to the NZMS Endowment for Student Support.

* The Society offers NZ students and new staff a special free one-year membership.

Please complete below and mail to:

John Shanks, NZMS Membership Secretary,
Department of Mathematics and Statistics,
University of Otago, P.O. Box 56, Dunedin, NZ

or Fax: +64 (3) 479 8427

E-mail: jshanks@maths.otago.ac.nz

NZMS Application Form

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A 2005 puzzle, a skew matrix and a mathematical musician

Sometimes it seems a nice thing to do, to propose a problem with the number of the current year built into it. I believe this often happens with Mathematics Olympiad questions and the puzzle I am proposing today is at a level a little below this.

Many years ago, when I was teaching myself how to do simulation calculations, I thought it might be a good idea to base pseudo random number sequences on difference equations over finite fields. Because, in those days, there was no choice but to work in machine arithmetic, with numbers in the set $\{-2^{39}, -2^{39}+1, \ldots, 2^{39}-2, 2^{39}-1\}$, I thought I should consider GF(p) where p is as close as possible to 2^{39} and generate my random number sequence using a simple difference equation, modulo p. The value of p was chosen as $2^{39}-7$ and the difference equation was the famous Fibonacci equation $x_n = x_{n-1} + x_{n-2}$ or, written another way,

$$\begin{bmatrix} x_n \\ x_{n-1} \end{bmatrix} = M \begin{bmatrix} x_{n-1} \\ x_{n-2} \end{bmatrix} \qquad \text{where} \qquad M = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}.$$

In congruential sequences it is possible to do some basic analyses of their statistical properties to see if they are likely to pass muster as pretend uniformly distributed random numbers. However, my only interest was to see how long the number sequence was before it started all over again. In other words the order of the group generated by M. A first step is to see if M is diagonalizable mod p. Because the characteristic polynomial of M is reducible if and only if 5 is a quadratic residue of p, we need to determine if this is the case. By the quadratic reciprocity theorem, this will be true iff p is a quadratic residue of 5 which it is in the case $p = 2^{39} - 7 \equiv 1 \mod 5$. Because M can be diagonalized, $M^{p-1} \equiv I \mod p$ and the order is therefore a divisor of $p-1 = 2^3 \cdot 3^3 \cdot 5 \cdot 7 \cdot 13 \cdot 19 \cdot 37 \cdot 73 \cdot 109$. A systematic exploration of the possible divisors shows that the order is $(p-1)/15 = 36650387592$. In the days of my first computer, it would have taken more than a millisecond to generate each pseudo random number so that more than a year would have passed before there was a repetition. With likely computer failures every hour or two, this was well beyond practical needs.

My little 2005 problem is just the same except that arithmetic is performed modulo 2005. This means solving two problems as above but with $p = 5$ and $p = 401$. In the field of integers modulo 5, the minimal polynomial of M is $\lambda^2 - \lambda - 1 \equiv (\lambda - 3)^2$ and the order of M turns out to be 20. As for 401, 5 is a quadratic residue and the order is found to be 200 (which is also the period of the Fibonacci sequence modulo $5 \times 401 = 2005$).

In a problem a colleague and I are working on, we wanted to search for something over the set of matrices X in n dimensions such that the spectral radius is $\rho(X) = 0$. Let T be a transformation to Jordan canonical form, so that $T^{-1}XT$ is zero except for the diagonal immediately to the right of the main diagonal. For the numerical search we are performing, we want to avoid the possibility that T will degenerate in some way. One way of avoiding this is to write $T = QR$, using the QR factorization (that is the product of an orthogonal matrix and an upper triangular matrix). The condition on X now becomes that the lower triangular part of Q^TXQ is zero. This can be generalized slightly by allowing the possibility that Q is post-multiplied by a diagonal matrix of ± 1 diagonals. Hence we might as well assume that $\det(Q) = 1$. To characterize Q as the search proceeds, we decided to write Q in terms of a skew matrix S such that $S = (Q+I)(Q-I)^{-1}$. There is still a danger that that the absolute values of some of the elements of S will drift upwards as perhaps Q drifts towards I. To avoid this we tried applying a diagonal post-multiplication to make sure that the computation of S is always possible and that the elements of S are reasonably small. Extensive computations have led us to believe the following might be true:

Given an $n \times n$ orthogonal matrix Q, there exists a matrix $D = \text{diag}(d_{11}, d_{22}, d_{33}, \ldots, d_{nn})$ with each $d_{ii} \in \{-1, 1\}$, such that $QD + I$ is non-singular and such that if

$$S = (QD - I)(QD + I)^{-1},$$

then the skew matrix S has every element in $[-1, 1]$. Hints on finding a proof or a rebuttal of this assertion are welcomed.

I keep writing these little pieces always looking forward to someone letting me know that he or she has read one of them. This week my patience was rewarded with a message from a person I have never met, saying she disagreed with something I wrote more than two years ago. In Miniature number 20 (April 2003) I gave my opinion that, although many mathematicians take an interest in music, it is less common for musicians to be interested in mathematics. I should have listened to my parents who passed on to me a culture which did not value personally held opinions. What I have learned from a short correspondence with this interesting lady, is that she is a musician with a passionate interest in mathematics. Of particular significance to her was the contention that spirals are a common feature in music and mathematics. I will read the notes she gave me more carefully to see if I can understand the connection she is referring to. However, I have already had considerable enjoyment from looking at a website she told me about: http://mathematische-basteleien.de.

Now it is time for me to retire from the pleasant task of composing these Miniatures.

John Butcher, butcher@math.auckland.ac.nz

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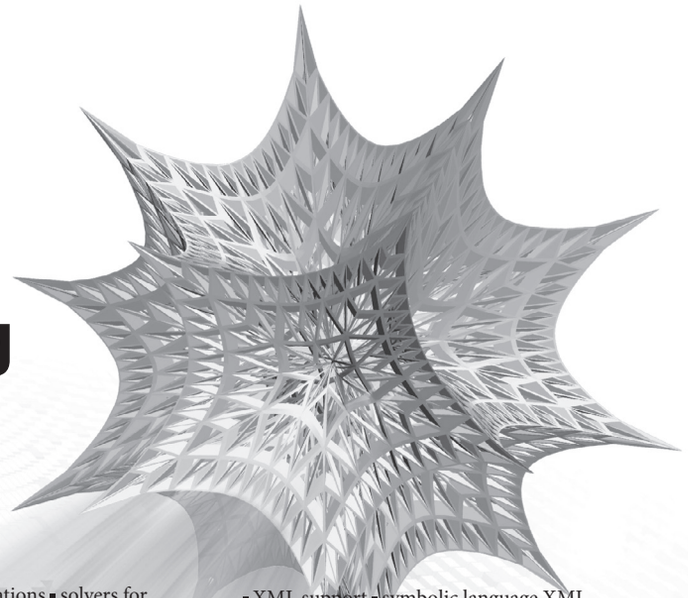

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