THE NEW ZEALAND
MATHEMATICAL SOCIETY (INC.)

NEWSLETTER

CONTENTS

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PUBLISHER'S NOTICE

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However, correspondence should normally be sent directly to the Secretary:

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NZMS COUNCIL AND OFFICERS

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Conferences	Dr Michael Carter (Massey University)
Visitors to New Zealand	Dr David Robinson (Canterbury University)

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LOCAL NEWS

CROWN RESEARCH INSTITUTES
Industrial Research Limited Applied Mathematics (Wellington)

The last few months have been rather productive for the applied mathematicians in IRL. In our new commercially oriented environment, we are keeping the system happy by running at a profit (or at least that is according to the accounting system). Also the results from the last bidding round for 1993/4 funding were largely favourable: most of our projects were funded, with even increases in some areas. Another piece of good news was the recent appointment of Russell Boyles to the statistician's job that we advertised late last year. Russell is currently the Statistical Process Control Manager in a large industrial company in the US, and he will arrive in Wellington in mid-August.

Graham Weir recently spent a week in Malaysia, visiting various institutions as part of a marketing junket. David Rhoades spent a couple of weeks in the US, where he also met some of the candidates for the statistician's job. Apart from that, everyone else has had their noses to the grindstone (probably that should be the latest hi-tech equivalent, given the image that IRL is trying to portray), especially so in the last month, as many of our projects have a completion date of 30 June (the end of the financial year).

John Burnell

UNIVERSITY OF AUCKLAND
Mathematics and Statistics

Lovina McMurchy has been appointed as Lecturer in the Statistics Unit.

John Butcher's 60th birthday, on March 31st, was celebrated at Eden Gardens (on the flank of Mount Eden) by John planting a young kauri tree (2m tall). A bronze plaque is to be mounted beside the tree, naming it the Butcher Tree. About 80 people attended that cheerful ceremony, in weather conditions which were absolutely perfect (for the tree).

The Department of Mathematics & Statistics has grown to unwieldy size, with 42 full-time permanent academic staff, numerous permanent tutors and part-time lecturers and tutors, plus several secretaries and a few computer technicians. Accordingly it is now being split into a Department of Mathematics and a Department of Statistics. Those new Departments will cooperate closely, within the School of Mathematical and Information Sciences.

The Department of Mathematics & Statistics has now got new computing laboratories, one for undergraduates and one for graduate students. The Department of Computer Science has expanded its undergraduate computing laboratory into the space which we have vacated. And the new Department of Statistics will want to find space for a computing laboratory to cater for its Stage 1 students – all 2000 of them!

Professor Andreas Dress, the NZMS Visiting Lecturer for 1993, visited here in April, and gave 2 seminars.

Four of the candidates for a Chair in Mathematics delivered seminars here in May: Dr Marston Conder (Auckland), Dr Winfried Kohnen (Max Planck Institute), Dr Konrad Schmüdgen (Leipzig) and Dr Boris Pavlov (St Petersburg). Vaughan Jones came from Berkeley to interview the candidates; and while he was here he received, from the Deputy Prime Minister, the first Rutherford Medal. That was 2 years after the Prime Minister had brandished at Vaughan a cardboard replica of that large gold medal.

In May, Ivan and Barbara Reilly visited some universities in China. They went first to Shandong

University, and then to the Southwest China Normal University (training teachers) at QongQing, capital of Sichuan province. They examined the degree course structures, and especially the mathematics courses. Ivan discussed possible arrangements for staff exchanges with Auckland University, and for students to come here for Ph.D. study. After Barbara flew home, Ivan travelled down the Yangtse River for 6 days on a large ship, on which he was the only non-Chinese passenger. (Excellent food!)

At the same time, Bill Barton visited Guizhou University, a small university which is the best in Guiyang province. The standard of mathematics education there is high, despite teaching conditions which are somewhat basic, and several students from various countries are studying mathematics there. Bill discussed possible arrangements for lecturer exchanges with Auckland University. He then went to England, to finalise arrangements which he has made for a British Council Higher Education Link Scheme between the Centre for Mathematics Education at the Open University and our Mathematics Education Unit. After that Bill went to the Netherlands, where he visited some of his former colleagues in Swaziland who are now teaching in the Netherlands. He then spent a day at the Freudenthal Institute in Utrecht, which is recognised as the world's leading mathematics curriculum development institute.

We have shared in the world-wide excitement over Andrew Wiles's achievement, in producing the first proof of Fermat's Last Theorem which has stood up to preliminary scrutiny by leading researchers in number theory. A cabinet display of relevant books has been mounted in our Science Library, with a leaflet summarising the history of that celebrated problem. That leaflet includes a photocopy of the first edition of Fermat's Last Theorem in Diophantos's *Arithmetica* (Toulouse, 1670), printing the notes which Fermat had written in his copy of the 1621 edition (copy in the George Grey Collection at Auckland Public Library). That first edition is on display at Auckland Public Library.

Seminars

Numerous internal seminars have been given by members of this Department, in algebra, analysis, numerical analysis, statistics, topology etc. Seminars have been given by the following visitors:

Prof. Andreas Dress (Bielefeld): "One more shortcut to Galois Theory". and "Cellular automata: a simplistic approach to complex pattern formation".
Dr Marston Conder (Auckland): "Graphs, groups and manifolds".
Dr Winfried Kohnen (Max Planck Institute): "Estimates for Fourier coefficients of cusp forms".
Dr Konrad Schmüdgen (Leipzig), "Covariant non-commutative differential calculi on quantum spaces and on quantum groups".
Dr Boris Pavlov (St Petersburg), "Harmonic analysis on Riemann surfaces, and Lax-Phillips theory for operators with band spectrum".
Dr Mary Silber (CalTech): "Pattern formation by symmetry-breaking Hopf bifurcation".
Dr Chris Calude (Computer Science): "Randomness as a universal invariant".

Garry J. Tee

UNIVERSITY OF CANTERBURY
Mathematics and Statistics

We are losing our chiefs at a tremendous rate! Professor Brian Woods has announced that he will take early retirement at the end of this year. We will miss Brian's many contributions to departmental life. Associate-Professor Graham Wood has accepted a chair at the University of Central Queensland. Graham will be taking up this new position in 1994. Our congratulations to Graham whom we will also sorely miss.

Congratulations to Steve McDowall on the acceptance of his masters thesis "Constructing infinite-dimensional polytopes".

There are currently two Erskine visitors in the department, Michael Stiassnie, working in Fluid Mechanics and Fractals, and Curt Lindner working in Combinatorics.

Seminars

Graeme Guthrie, "Miura transformations and symmetry groups of differential equations."
David Buldger, "Initial value problems in scales of Banach spaces."

Audrey Tan, "Use of derivative data in the inverse eigenvalue problem for Jacobi matrices."
Baoping Zhang, "Finite convergence of Lipschitz based sequential algorithms for GOP."
Andreas Dress (Bielefeld), "Cellular automata: a simplistic approach to complex pattern formation" and "A mathematical theory of equivalent tilings"
David Spence (Imperial College, London), "Elastohydrodynamic shock waves."
Zelda Zabinski (Seattle), "Using global optimization to design composite structures."
Roger Penrose (Oxford), "Impossible crystals" and "Magic dodecahedron."
Paul Smith (Seattle), "Polynomial solutions of constant coefficient differential equations."
Michael Stiassnie (Technion, Haifa), "Introduction to fractal analysis" and "The fractal dimension of the ocean surface."
Rick Beatson, "Fast evaluation of radial basis functions" and "A gentle introduction to spherical harmonics in $\mathbb{R}^n$."
Bill Baritompa, "A random walk around stochastic optimization making progress toward some convergence results."
Ernie Kalnins (Waikato), "Separation of variables and integrable systems."
Mark Hickman, "Latex for beginners."

Rick Beatson

MASSEY UNIVERSITY
Mathematics

Student EFTS numbers are almost the same as last year, although the student-staff ratio remains higher than it should be. Dean Halford has been appointed for another two-year term as Deputy Head of Department. Gordon Knight and Mike Hendy were promoted within the Associate Professor range.

Julie Falkner has now arrived and taken up her appointment as Lecturer in Mathematics (see profile elsewhere in this edition). Chris Price, after doing a sterling job within the Department over the last 18 months, has left for Christchurch; Chris's high standard of professionalism was noted during his time here. Marijcke Vlieg has submitted her PhD thesis and is now spending her time doing mathematical modelling at Lincoln. Mark Byrne has also submitted his PhD thesis and is working on contract research in Wellington while awaiting his oral.

Graeme Wake completed his term as external examiner and advisor for Mathematics at the Universiti Brunei Darussalam in S.E. Asia with a 10-day visit during May. One student from there is presently completing his MSc in Mathematics at Massey, while another two are in prospect (including one in Computer Science).

Rhys Gibson and Kelvin Watson were awarded Industrial Research Ltd Bursaries in Applied Mathematics for 1993.

A new degree, BSc(MathInf), has been approved by the Science Faculty Board and, if given final approval, will be offered at both of our campuses (Palmerston North and Albany) in 1994. Proposed as an endorsed version of the current BSc, the degree will require students to undertake a significant amount of study in at least three of the four subject areas taught by the departments within the School of Mathematical and Information Sciences, these being Mathematics, Statistics, Computer Science and Information Systems. The Department looks forward to making a substantial contribution to the teaching of this degree.

The visits of Roger Penrose, the 1993 Forder Lecturer, and Andreas Dress, the NZMS Visiting Lecturer for 1993, both provided considerable interest and stimulation within the Department, and also throughout the University and the local community.

Seminars

Mathematics

Dr Bruce van Brunt, Mr Koryn Grant (Massey) "Hyperbolic Weingarten surfaces"
Mr Kelvin Watson (Massey) "The multiple capacitated delivery person problem"
Assoc. Prof. Gordon Knight, Dr Greg Arnold, Dr Mike Carter, Mr Peter Kelly & Dr Gillian Thornley (Massey) "The mathematical needs of New Zealand school leavers"
Dr Andreas Dress (University of Bielefeld) "A new elementary approach to Burnside's theorem concerning permutation groups of prime degree", "Cellular automata: a simplistic approach to complex pattern formation", "A new perspective concerning greedy algorithms"

Dr Zelda Zabinsky (University of Washington) "Using global optimisation to design composite structures"
Mr Shane Dye (Massey) "Keeping the lights on - a network approach to solving the NZ power scheduling problem"
Dr Charles Little (Massey) "A characterisation of outer-projective-planar graphs"
Dr Ken Louie (Massey) "How does bovine tuberculosis affect our unwelcome Aussie overstayer? Threshold and stability analysis for the spatial spread of a fatal disease"
Dr Clive Marsh (Production Technology, Massey) "An optimal nonlinear approach to controller design for active suspension systems"
Dr Julie Falkner (Massey) "Finding bounds on the solution of the graph partitioning problem"
Mr Simon Woodward (Massey) "A differential-delay model of pasture accumulation and loss in controlled grazing systems"

Mathematical Physics

Dr Robert McKibbin (Massey) "Equations of continuum mechanics"
Dr Bruce van Brunt (Massey) "Some aspects of global differential geometry"
Prof. Roger Penrose (University of Oxford) "Twistors and Einstein equations", "Computability and the mind", "Magic dodecahedra and the mystery of quantum entanglement", "Cosmology, quantum theory and the arrow of time"
Dr Graham Weir (Industrial Research Ltd) "Fluidised flows", "Electromagnetic propagation about conducting surfaces"
Dr Alex McNabb (Massey) "Comparison theory and differential equations"
Dr Ram Kakarala (University of Auckland) "Geometrical invariants for spherical functions"
Prof. John Lekner (Victoria University) "Long range forces in computer simulations"

Robert McKibbin

OTAGO UNIVERSITY
Mathematics and Statistics

As usual, there is much happening here in Otago. Besides the usual range of teaching and administrative tasks we have managed to maintain an active seminar series and we currently have some international visitors. Professor Bob Hemminger, a well known graph theorist from Vanderbilt University, has been with us since late in May and will remain until mid August. Bob is becoming a regular visitor here and, as usual we are very pleased to have him. We also have Dr. Nick Tufillaro visiting from National Labs, Los Alamos, New Mexico. Nick works in non-linear dynamics and dynamical systems. In addition to working on some chaos experiments in guitar strings we have managed to persuade him to give a course in differential equations before he leaves in December.

Derek Holton is on leave in Wisconsin at the moment, and John Clark is spending the second term in Scotland. In their absence, the rest of us have so much to do that I really should get back to it.

Robert Aldred

VICTORIA UNIVERSITY
Mathematics

Vladimir Pestov is an invited speaker both on Universal Arrows in Topological Algebra at the Annual Meeting of the Australian Mathematical Society, and on Analysis on Superspace at the satellite Analysis Miniconference (both to be held this July, Wollongong, NSW). He is now taking his seminar series for staff and graduates on Quantum Groups for the second year in succession. The average attendance (in this small department) is about 6.5 persons.

Rod Downey and Colin Bailey both gave papers recently at the Sacks Symposium in Boston on Logic; Rod's overseas trip also included a visit (with lecture) to the University of Victoria, BC, Canada, and to the Symposium on the Theory of Computing, Structure and Complexity in San Diego.

Philip Rhodes-Robinson is away at the time of writing to give a paper at the Society for Industrial and Applied Mathematics in Philadelphia and to visit colleagues elsewhere in USA and UK.

Thora Blithe is about to go on sabbatical to Windsor, Ontario.

Chris Atkin should have returned from sabbatical before this Newsletter is published.

Mark McGuinness has recently acquired an IRIS-Indigo workstation for geothermal flow visualisation. He claims the purpose was not to get a stream of computer types coming drooling to his office.

J F Harper

Institute of Statistics and Operations Research

ISOR boosted its cosmopolitan image this term with the arrival of Dr Abel Ige, a visitor from Nigeria, and Hongsheng Gao, a PhD student from China. Abel is working in the sample survey area with Stephen Haslett, and Hongsheng Gao is working on optic fibre communication theory with Peter Smith. Both arrivals demonstrate that even the knottiest visa problems can be conquered given sufficient effort. Funding for Hongsheng Gao has come from NZ Telecom who are also supporting Howard Silby, an MSc student working on network reliability with Yu Hayakawa and Peter Smith. Rolf Turner (University of New Brunswick) is also due to visit in July to work with Peter Thomson on (surprise, surprise!) time series.

Another venture generating extra staff is the FORST project established by David Vere-Jones, Peter Thomson and Thomas Mikosch. Funding for around $250,000 has been granted for the first year and brings with it some postgraduate students, visitors, David Harte and Robert Davies. David will be appointed as an Assistant Lecturer and will follow a PhD programme centred on the FORST project. Robert will be employed on a contract basis also under the FORST umbrella.

An unfortunate consequence of all this activity is a severe shortage of space in ISOR. Jokes about using tents on the top of the Cotton Building are ceasing to seem so funny.

The dreaded word "administration" has been much in evidence lately. With David about to go on conference leave, a new chairperson has to be elected and will face the difficult task of following on from David's excellent three years of leadership. In addition there have been moves afoot to create advisory boards to help in the running of ISOR's internal and external consulting programmes.

It seems that the conference season has begun with Megan Clark heading off to Italy for the inaugural IASE meeting in August and to Sweden for an ICMI (International Commission on Mathematical Instruction) Study Group on gender issues in mathematical education. Megan is also busy as head of the Mathematics Education Unit, which has been granted approval to expand into a Mathematics and Science Education Unit and to acquire more staff from the Wellington College of Education/University Faculty of Education. David will also attend the IASE Conference and plans to spend a month working at Montpellier in the South of France. Ray Brownrigg was Program Coordinator for the Uniforum NZ 1993 Conference and brought off a coup in arranging for Ken Thompson, the original author of UNIX, to attend and give a presentation.

On to the social scene, we had a successful quiz night with questions ranging from "What is Renner's middle name?" to "Who sang Monkey Man?" An epic soccer clash between ISOR and the Department of Statistics resulted in a 5:1 (or was it 6:2) victory for the Auld Enemy despite ISOR fielding 13 people at various stages. Thomas Mikosch was impassable as the iron man of the ISOR defence. Perhaps our most important recent claim to fame is the progress of Stuart Turner (ex ISOR Teaching Assistant and graduate student) who is reported to be coaching the Dutch Women's Cricket Team in Amsterdam. And who said statisticians lead boring lives?!

Peter Smith

UNIVERSITY OF WAIKATO
Department of Mathematics and Statistics
Waikato Centre for Applied Statistics

Douglas Bridges was acting Dean of Computing and Mathematical Sciences for several months while Ian Graham was on leave. Douglas has now proceeded to Cornell until round the end of the year where he will be studying computational complexity. Alfred Sneyd meanwhile has been and will be acting head of department.

Working with Alfred is Dr Takeshi Sugimoto from the Saitama Institute of Technology, Japan. He's working on optimizing the lift distribution on a yacht sail, taking into account heeling and yawing. He arrived the beginning of April and will be at Waikato for one year.

Jeff Knowlton left at the end of the first term to return to his original position in US industry. He will be sorely missed. His position, together with a position in algebra, will probably both have been filled by the time this Newsletter goes to press. More details on the successful candidates next issue.

Heather Rae has, we regret, has had to take a period of sick leave. Our best wishes for a complete recovery and thanks to John Turner and Mark especially for stepping into the breach.

Professor Wilf Malcolm has announced his retirement from his position as Vice-Chancellor of the University for personal and professional reasons, from 1 July 1994. We wish him well in the years that follow and begin, without relish, the task of finding a replacement equal to the daunting task of getting more and more out of less and less (income of course for those too buried in a check of the proof of Fermat's Last Theorem to have noticed the cuts in University funding).

Professor Richard Fateman of the University of California at Berkeley Department of Computer Science visited Kevin Broughan and worked together on fast numeric processing with Common Lisp.

Ingrid Rinsma-Melchert presented a paper entitled "Storing Sparse Sets: theory and practice" at the 9th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing at the University of Adelaide in July.

Nye John of the Centre for Applied Statistics has left for the University of Queensland where he will be on Study leave for 6 months working with Professor John Eccleston on aspects of experimental design. There has been a significant increase in the number of post-graduate students in the department who now number eight. They produce a buzz of activity and enthusiasm.

On the academic structure front there has been considerable interaction between the School of Science and Technology and Computing and Mathematical Sciences, with the outcome being the possibility of students taking a BSc in the latter school. The 4 year BCMS remains as an optional programme. It is envisaged that this new possibility should be available from the start of the 1994 academic year.

There have also been developments on the graduate course front: for example complex analysis is to be included in the Advanced Analysis course.

The mathematical software project continues with its active development of Senac features: large sparse linear programming with algebraic interactive input, global optimization and finite element analysis are some of the recent new-generation extensions. The most active moving front is currently automatic mesh generation in two dimensions. A PC port is almost complete.

In January John Turner took over from Exscite (Hamilton's up-market continuing science exhibition) the responsibility for planning and presenting in Hamilton the touring exhibition "Common Threads." The theme of the exhibition is textiles and related mathematics. Some concepts explored within the crafts and textiles context are number, symmetry, coding, patterns and design, and transformations. It originated in London, and toured Britain for two years before being sent to NZ by its chief sponsor, the British Council. It ran at the Gardens Pavilion in Hamilton in April and May and attracted close to 2000 school children and some 500 other visitors. Andy Begg of the Centre for Science and Mathematics Education Research was a member of the organising committee, as were several local High School Mathematics Teachers. It was generally agreed that the exhibition was very successful in Hamilton; in particular that it struck a blow for more feminine-oriented topics in the curriculum. Substantial documentation was produced: for details contact John Turner.

Seminars

Ingrid Rinsma-Melchert, Bill Teahan and Ian Witten, "Storing Sparse Sets: theory and practice".
Douglas Bridges, "The nth power formula for the derivative in a ring", "Abstract complexity and the speed-up theorem".
Mark Schroder, "Infinitesimals - the "Ghosts of departed quantities' begin to take shape".
Cristian Calude (University of Auckland), "Three theories of Computational Complexity" and "Randomness as a universal invariant
Roger Penrose (University of Oxford), "Computability and the mind", "Cosmology, Quantum Theory and the arrow of time", "Twistors and integrable systems".
Jeff Knowlton, "Minimum bias designs for exploratory computer experiments".
B D McKay (Australian National University), "Recent advances in Graph Ramsey Theory".
Andreas Dress (University of Bielefeld), "Trees, Buildings and Matroids", "A shortcut to Galois Theory", "Cellular Automata".
Marston Conder (University of Auckland), "Graphs with no small circuits".
James Lyness (Argonne National Laboratory), "Multidimensional extrapolation quadrature: an overview".
Ivan Reilly (University of Auckland), "Non-Hausdorff spaces".
Greg Chaitin (IBM Yorktown Heights), "The LISP halting probability".
Richard Fateman (University of California at Berkeley), "A proposal for automated integral tables".

Kevin Broughan

NOTICES

ANZIAM
Applied mathematics news and an invitation

This is to bring you up to date with developments in the organisation of Applied Mathematics in New Zealand. Stimulated by the strong activity of the Division of Applied Mathematics of the Australian Mathematical Society we, on this side of the Tasman, have taken a number of initiatives (see below). The activities of the Division are well known and include:

- Annual Conference in Australia or NZ in February;
- Publication of the only Journal in Applied Mathematics originating from the region;
- Spawning of regional branches which sponsor local activities;
- Provision for non-Australian resident mathematicians to join the Division directly through the New Zealand Mathematical Society (or any other Society with which the Australian Mathematical Society has a reciprocity agreement).

Recently the Division formally changed its name to the

AUSTRALIAN AND NEW ZEALAND INDUSTRIAL AND APPLIED MATHEMATICS (ANZIAM)

to recognise our involvement and to align it to the International Commission (ICIAM).

A New Zealand branch of ANZIAM has now been formed (in February 1993) with terms of reference to include

(i) sponsoring a lecture in Applied Mathematics at the annual NZ Mathematics Colloquium;
(ii) the organisation of regional activities in Industrial and Applied Mathematics in New Zealand.

At the forthcoming 1993 Mathematics Colloquium we are fortunate in having as the ANZIAM Lecturer *Dr Noel Barton (CSIRO), President, ANZIAM* who will speak on "Mathematical and Computational Modelling for Industrial Applications" in the late afternoon, Monday 23rd August, followed by a brief inaugural meeting of the Branch. At this meeting the interim committee (myself, Mr Adrian Swift (Massey), Dr Graham Weir (IRL, Wellington)) will briefly report on activities and seek your endorsement of the steps taken to date.

If you wish to join the NZ Branch of ANZIAM, please inform Mr Adrian Swift (Department of Mathematics, Massey University - who is interim secretary and treasurer) and enclose a membership fee of $NZ10 (which is passed on to our Australian Committee). We were given a setting up grant and 1993 grant totalling $843.76.

If you already are a member of ANZIAM, WELCOME and we look forward to your support at CHRISTCHURCH in August. Please send to us any views and nominations for the offices of the branch.

We look forward to your support in this new venture which should provide an excellent example of trans-Tasman cooperation.

G C Wake
Professor of Applied Mathematics
Interim NZ Branch Chairman, ANZIAM

PUBLICATION AVENUE FOR APPLIED MATHEMATICIANS

New Zealand (and the Southern Hemisphere) now has a representative on the Editorial Board of the journal of rapid publication *Applied Maths Letters*. Professor Graeme Wake, address below, is that person and is authorised to receive and process short papers covering all aspects of applied mathematics.

By "short" is meant five or fewer pages, preferably in TeX, submitted by e-mail if preferred. Prospective authors are invited to contact Professor Wake for further details: Mathematics Department, Massey University, Tel (06) 350-5081, Fax (06) 350-5611, E-mail G.Wake@massey.ac.nz.

THE FERRAN SUNYER I BALAGUER PRIZE 1993

Ferran Sunyer i Balaguer (1912 - 1967) was a self-taught Catalan mathematician who, in spite of a serious physical disability, was very active in research in classical Mathematical Analysis, an area in which he acquired international recognition.

Each year in honour of the memory of Ferran Sunyer i Balaguer, the Institut d'Estudis Catalans awards an international mathematical research prize bearing him name. This prize has been awarded for the first time in April 1993. The competition is open to all mathematicians, subject to the following conditions:

1. The prize will be awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in Mathematics, in which the applicant has made important contributions.

2. The monograph must be original, written in English, and of at least 150 pages. In exceptional cases, manuscripts in other languages may be considered.

3. The prize, amounting to 12,000 ECU, it provided by the Ferran Sunyer i Balaguer Foundation. The winning monograph will be published in Birkhäuser Verlag's series "Progress in Mathematics", subject to the usual regulations concerning copyright and author's rights.

4. The winner of the prize will be chosen by a Scientific Committee consisting of:

   Prof. Gerhard Frey (Universität Essen);
   Prof. Joan Girbau (Universitat Autònoma de Barcelona);
   Prof. Paul Malliavin (Université de Paris VI);
   Prof. Joseph Oesterlé (Université de Paris VI);
   Prof. Alan Weinstein (University of California at Berkeley).

5. Monographs, preferably typeset in TEX, should be sent to the following address, and must arrive there before January 15, 1994 in order to be considered:

   Institut d'Estudis Catalans
   Carme, 47
   08001 Barcelona
   SPAIN
   e-mail: icrm0@cc.uab.es

6. The name of the prize-winner will be announced in Barcelona in April, 1994.

7. The submission of a monograph implies the acceptance of all of the above conditions.

1993 NEW ZEALAND MATHEMATICS COLLOQUIUM
Canterbury University, Monday 23 – Thursday 26 August, 1993

The Colloquium will incorporate the Annual Meeting of the New Zealand Mathematical Society, and also the inaugural meeting of the New Zealand Branch of ANZIAM. The last day of the Colloquium will be devoted to Mathematics in the Biological Sciences.

There has been a gratifying amount of interest in the Colloquium, and the Colloquium Committee looks forward to an attendance of between eighty-five and one hundred. If you returned the "Expression of Interest" then you should have received a registration form by now. We apologize for the error in the numerical dates on the housing section of some copies of that form. These should all be decremented by one, so that the Sunday is Sunday 22, August.

If you have not already registered, it is not too late, we would welcome your late registration.

If you need to contact us the address is NZMC93, Mathematics Department, University of Canterbury, Private Bag, Christchurch, e-mail: nzmc93@math.canterbury.ac.nz

We look forward to welcoming as many of you as possible to the Colloquium!

Rick Beatson

NEW POSITION
University of Auckland, Tamaki Campus

The Tamaki Campus is the second campus of the University of Auckland, being developed as part of the University's strategy for meeting the need for university education, particularly in the largest city in New Zealand. Staff at the Tamaki campus teach for the degrees of the University but they also have the opportunity to initiate and innovate. Based 12 km from the city centre, they are members of Departments and Faculties on the City Campus, have access to its resources and be invited to take part in its academic programmes. At the same time they may expected to be able to work in an interdisciplinary fashion more often than is common on the City Campus and to deal with smaller classes.

Applicants must have advanced qualifications (a PhD or equivalent is expected) and a proven research and teaching record in applied or industrial mathematics, statistics, operations research or mathematical modelling or in a field closely related to these, preferably with links to one or more of the special areas being developed at Tamaki, viz Industrial Mathematics, Information Technology, International Business, Environmental Management and Sports Medicine.

The appointee will be expected to begin teaching during the academic year that commences in February 1994.

Commencing salary will be established within the range $NZ37,440 to $NZ49,088 per annum for Lecturers, $NZ52,000 to $NZ60,944 per annum for Senior Lecturers.

Further information, Conditions of Appointment and Method of Application, should be obtained from the Academic Appointments Office, Telephone 64-9-373 7999, Extn 5097; Fax 64-9-373 7454. *Three copies* of applications should be forwarded to reach the Registrar *by 27 September 1993*. Please quote *Vacancy Number UAC.309* in all correspondence.

The University has an EEO policy and welcomes applications form all qualified persons.

WB Nicoll
Registrar

NEW COLLEAGUES

WOLFGANG VOGEL

Massey University has appointed Professor Wolfgang Vogel from Cornell University (US) and Martin Luther University, Halle (Germany) as Professor of Pure Mathematics within the Mathematics Department. He takes up his appointment in August 1993. His research areas include Algebraic Geometry and Commutative Algebras especially intersection theory. Also he has interests in Computer Algebra and Combinatorics. German born and bred, Professor Vogel has spent extensive periods abroad in the US, parts of Europe and in Asia. He is the author of four books in the above areas and nearly 100 research papers.

Bill Barton

Bill Barton (45) took up a lectureship in mathematics education in the Mathematics and Statistics Department of Auckland University early this year.

A former lecturer in mathematics education at the Auckland College of Education, Mr Barton has also been involved in teaching the DipMathsEd programme offered jointly by ACE and the University of Auckland.

A trained teacher, he has BSc and MSc degrees in mathematics from the University of Auckland and an MPhil in education from Massey University. His masters thesis project was on the philosophy of mathematics education. He has taught secondary school mathematics and science in New Zealand since 1972. For four years in the late 1970s he lectured in mathematics and mathematics education at the University College of Swaziland and has since acted as a consultant on mathematics education to the Swaziland government.

His current research interests lie in ethnomathematics and the relevance of this discipline to bilingual/bicultural education and technology in mathematics education.

BOOK REVIEWS

Second Year Calculus, by David M. Bressoud. Springer-Verlag, Berlin-Heidelberg-New York, 1991, xi + 386pp, DM 58.00. ISBN 3-540-97606-X.

This book represents an unusual approach to the teaching of a second course in calculus. In many ways it reminds me of Weatherburn's classic *Advanced Vector Analysis*, which in my student days, was the standard text on div, grad, curl, etc and their applications in physics. Like Weatherburn, Bressoud finds the motivation for the mathematics in the physics of gravity, electromagnetism, and heat; but in contrast to his venerable predecessor, Bressoud is less concerned with vectors and tensors (or dyadics) than with differential forms. This enables him to present multivariable calculus in a particularly appealing way, with reasonable mixtures of rigour and intuition, proof and example, theory and application. Throughout the book there are many historical asides which pay tribute to the masters of the past and which add colour to the presentation. There are also applications of the results and techniques to physics, culminating in a quick tour through Maxwell's equations and special relativity.

The author defines differential forms without reference to the usual notions of exterior algebra. For example, a **differential 1-form** $g(x)\,dx$ of one variable is a real-valued mapping

$$[a,b] \mapsto \int_a^b g(x)\,dx \in \mathbf{R},$$

defined on the set of compact intervals, that is invariant under invertible differentiable transformations, in the following sense: if $x = f(t)$, then $g(x)\,dx = g(f(t))\,f'(t)\,dt$, where $g(f(t))\,f'(t)\,dt$ is the differentiable form

$$\left[f^{-1}(a), f^{-1}(b)\right] \mapsto \int_{f^{-1}(a)}^{f^{-1}(b)} g(f(t))\,f'(t)\,dt = \int_a^b g(x)\,dx \in \mathbf{R}.$$

Similarly, differentiable 3-forms map oriented tetrahedra to real numbers. So if $\rho(x, y, z)$ denotes the mass density at the point (x, y, z), then the 3-form $\rho(x, y, z)\,dx\,dy\,dz$ maps a 3-dimensional region that can be built out of tetrahedra to the mass of that region.

The book contains standard material on multivariate calculus (supported by a useful chapter on linear transformations): the Riemann multiple integral, change of variables, partial differentiation, extrema, Lagrange multipliers, ... The author's approach to the subject is well illustrated by his presentation of the Fundamental Theorem of Calculus in the following very general form, of which the theorems of Green, Gauss, and Stokes are special cases:

> *Let M be a bounded, twice continuously differentiable, oriented $(k+1)$–dimensional manifold in $\mathbf{R}^n$ (where $n \geq k+1$), with a k–dimensional boundary ∂M, and let $\omega(\vec{x})$ be a continuously differentiable k–form in $\mathbf{R}^n$. Then $d\omega$ is a $(k+1)$–form and*
>
> $$\int_{\partial M} \omega = \int_M d\omega.$$

Here, of course, $d\omega$ stands for the differential of the form ω, which is defined by the following conditions:

> *If ω is a constant form, such as $dx\,dy$, then $d\omega = 0$;*
>
> *$d(\omega_1 + \omega_2) = d\omega_1 + d\omega_2$ for all forms ω_1, ω_2;*
>
> *$d(f\omega) = (d\,f)\omega + f\,d\omega$ for any scalar field f and any form ω.*

In his final chapter, Bressoud weaves the main strands of the book into a beautiful tapestry of applications to physics. In one of these, he considers **Maxwell's equations**:

$$\nabla \cdot \vec{B} = 0,$$

$$\nabla \times \vec{E} + \partial \vec{B}/\partial t = 0,$$

$$\varepsilon \nabla \cdot \vec{E} = \rho,$$

$$\nabla \times \vec{B} - \varepsilon\mu\,\partial \vec{E}/\partial t = \mu \vec{J},$$

where $\vec{E}, \vec{B}$ and $\vec{J}$ are respectively the electric field, the magnetic field (flux), and the current density field; ε and μ are the dielectric constant and the magnetic permeability of the medium; and ρ is the charge density. He shows how these four equations can be captured, using the language of differential forms, in two:

$$d(\mathbf{B} + \mathbf{E}dt) = 0,$$

where

$$\mathbf{B} = B_x dy\,dz + B_y dz\,dx + B_z dx\,dy,$$

$$\mathbf{E} = E_x dx + E_y dy + E_z dz;$$

and

$$d\left(\mathbf{E} - \frac{1}{\varepsilon\mu}\mathbf{B}dt\right) = \frac{1}{\varepsilon}\mathbf{J},$$

where

$$\mathbf{B} = B_x dx + B_y dy + B_z dz,$$

$$\mathbf{E} = E_x dy\,dz + E_y dz\,dx + E_z dx\,dy,$$

$$\mathbf{J} = \rho\, dx\,dy\,dz - J_x\, dy\,dz\,dt - J_y\, dz\,dx\,dt - J_z\, dx\,dy\,dt.$$

This formalism facilitates a discussion of the electromagnetic potential, a 3–form Φ in (x, y, z, t)–space that satisfies **d'Alembert's equation**

$$\varepsilon\Box^2\Phi + \mathbf{J} = 0,$$

where the **d'Alembertian** operator $\Box^2$ stands for

$$\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} - \varepsilon\mu\frac{\partial^2}{\partial t^2}\ .$$

As the author points out, the appearance of the d'Alembertian 'immediately marks electromagnetic potential as a wave phenomenon'.

Bressoud's book could be used as a text for an excellent course in multivariate calculus for good students being prepared for future work in either mathematical physics or analysis. For students of the first kind it gives a good, accessible introduction to vector calculus expressed in the modern framework of differential forms. On the other hand, it provides potential pure mathematicians with most of the standard, and some nonstandard, material in a second course in calculus at a satisfying level of rigour. For both types of student the book contains a clear message within its historical comments: great physicists, like Maxwell, have a good grounding in mathematics; and great mathematicians, like Gauss, frequently derive inspiration from advances in physics.

Douglas Bridges
University of Waikato

Introduction to Hamiltonian dynamical systems and the N-body problem, by K.R. Meyer and G.R. Hall. Springer-Verlag, Berlin-Heidelberg-New York, 1992, xii + 292pp, DM 98.00. ISBN 3-540-97637-X.

This book develops the basic theory of Hamiltonian differential equations from a dynamical systems point of view. By this is meant that the solutions of the differential equations are thought of as curves in a phase space and it is the geometry of these curves that is the important object of study. The book begins with the study of Hamiltonian differential equations and the N-body problem. This first chapter sets out the basic problems and discusses some simple solutions such as the Euler-Moulton collinear solutions and equilibria for the restricted three body problem. The text then goes on to discuss linear Hamiltonian systems—including symplectic structure, periodic systems and Floquet theory and critical points of the restricted problem. Exterior algebra and differential forms are them developed and used in the subsequent chapters, in particular, the next chapter on symplectic transformations and coordinates. The book then turns to a look at the geometric structure of orbits of Hamiltonian dynamical systems. This material contains such well known topics as a discussion of discrete dynamical systems, Noether's theorem and the stable manifold theorem. Subsequent chapters cover the topics of Continuation of periodic solutions, Perturbation theory and normal forms, Bifurcation of periodic orbits, Stability and KAM theory and Twist maps and invariant curves. This book is written at a level suitable for graduate students and would form a good basis for a course on Hamiltonian dynamical systems.

At the end of each chapter are illustrative and realistic examples. The level of mathematical exposition is quite manageable and difficult theorems such as the invariant curve theorem are presented and discussed without detailed proof. Another useful feature of this book is its inclusion of some useful computer algorithms which

can, for example, put a Hamiltonian in normal form to a given order.

Throughout the discussion examples (such as Duffing's equation) of the concepts are given and their relevance to the N-body problem is discussed when appropriate. This is a useful book to have a look at— one of the many available these days on aspects of dynamical systems.

E.G. Kalnins
University of Waikato

SPRINGER AND BIRKHÄUSER PUBLICATIONS

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

David Alcorn
Department of Mathematics and Statistics
University of Auckland
(e-mail: alcorn@mat.aukuni.ac.nz)

Applications of Mathematics

23.	Kloeden PE	Numerical solution of stochastic differential equations. 632pp.

DMV Seminar (Birkhäuser)

17.	Ljung L	Stochastic approximation and optimization of random systems. 120pp.
18.	Roggenkamp KW	Group rings and class groups. 216pp.

Encyclopaedia of Mathematics

20.	Onishchik AL (ed)	Lie groups and Lie algebras I. (Foundations of Lie theory. Lie transformation groups.) 235pp.
39.	Arnol'd VI (ed)	Dynamical systems VIII. (Singularity theory II. Applications.) 235pp.

Monographs in Mathematics (Birkhäuser)

84.	Triebel H	Theory of function spaces. II. 380pp.

Universitext

	Schiff J	Normal families. 236pp.

Miscellaneous

	Caglioti G	The dynamics of ambiguity. 170pp.
	Dieudonné J	Mathematics – the music of reason. 287pp.
	Pilyugin SYu	Introduction to structurally stable systems of differential equations. 200pp.

SURVEY ARTICLE

DOCTORAL STUDIES IN MATHEMATICS AND STATISTICS

Introduction

The primary purpose of this survey article is to provide information for prospective doctoral students in Mathematics and Statistics. While the following information is reasonably comprehensive it is really intended just to help students decide from which departments they would like to seek further information. Research (and common sense) indicate that students who have enough information to make an informed choice about where they would like to study are more likely to make satisfactory progress and complete their degrees. The rationale behind including information on the gender and ethnic background of current staff and doctoral students is that prospective students from a minority grouping might feel more comfortable in a department where there are a few other people from the same grouping.

Having gathered this data it is impossible to refrain from commenting on a couple of aspects. There are 165 lecturing staff listed, of those 17 (10%) are female. More encouragingly, of the 51 current doctoral students 16 (31%) are female. Certainly this is a large improvement over the situation of a decade ago. Originally it was intended to include a numerical breakdown by ethnicity but collection of such information seemed upsetting to a number of people, consequently it was felt that a simple listing would suffice. One doesn't need the actual numbers to observe how very few (if any) Maori and Pacific Islands people either lecture or are doctoral students in our departments.

Permission to write this article was given by the NZMS Council. The information was collected from each department by sending a questionnaire to the HOD. After a draft of the article had been written a copy was sent to each person listed as being the doctoral student contact person for them to correct or modify as they wished. Not all replied, consequently there are probably a few errors that have slipped by; it is hoped they will not cause any inconvenience.

Requirements for Entry and Completion

The following comments pertaining to their doctoral programme apply in general to all departments.

1. The usual entry qualification is a reasonable honours degree at either the bachelor or masters level.
2. Maximum length of study is 6 years. Average length is 3-4 years and there is a requirement that the first 2 years be fulltime.
3. The normal requirements for completion are:
   (i) Completion of any deficient coursework required at time of enrolment
   (ii) Completion of thesis containing original research which is passed by an external examiner and subject to an oral examination.

Funding

Possible sources of funding fall into two categories; those which are available for study at any university and those which are specific to an individual department.

GENERAL FUNDING SOURCES

1. The NZ Government offers postgraduate scholarships to students from other parts of the Commonwealth under the Commonwealth Scholarship and Fellowship Plan. For students from countries within the Pacific area which are included in NZ's Overseas Development Aid Programme, scholarships are available to provide for the payment of full cost tuition fees from the NZ Ministry of External Relations and Trade.

2. Industrial Research Ltd will be offering postgraduate study awards for the first time in 1994. Two types are envisaged but details are yet to be finalized. :
   (i) Open to women only (also available to masters students), 4 at $8,000 per year. Academic excellence, financial need, and an ability to be a good role model will be taken into consideration.
   (ii) Open to all, 4 at $12,000 per year.

3. Postgraduate Scholarships, administered by each individual university.

DEPARTMENTAL FUNDING SOURCES

- Auckland (Maths and Stats). Tutoring and/or lecturing within the department (max $16,000pa); departmental scholarships to overseas students.
- Canterbury (Maths & Stats). Tutoring within the department (max $7,200pa).
- Massey (Maths). Tutoring within the department (max $17,000pa); contract research through Departmental Consulting (variable amounts).
- Massey (Statistics). Tutoring and/or lecturing within the department (max $17,000).
- Otago (Maths and Stats). Targeted Otago Research Scholarship; demonstrating and tutoring within the department.
- Victoria (Maths). Marking and/or tutoring within the department.
- Victoria (Stats & OR). Scholarship money from outside institutions.
- Waikato (Maths and Stats). Departmental scholarships (max $6,000); industrial sponsorship, tutoring within the department (max $5,000).

Research Interests

All departments offer a wide range of research interests. For each department the first list gives topics doctoral students are currently working on and the second possible areas for future doctoral students.

- Auckland (Maths and Stats)

  Current: Combinatorial computation using distributed processing, combinatorics, biostatistics, estimates for a multivariate BIBD design, group theory, integration theory, numerical analysis, gender and mathematics, statistical ecology.

  Possible: (Applied and Computational Mathematics) dynamical systems, mathematical acoustics, numerical analysis (especially applied to differential equations), ocean/ice wave interaction in Antarctica.

  (Mathematics Education) ethnomathematics, secondary/tertiary interface.

  (Pure Mathematics) algebra, analysis, combinatorics, complex analysis, geometric function theory, group theory, history of mathematics, logic, number theory, ring theory, summability theory, topology.

  (Statistics) biostatistics, computer language design, generalised linear models, operations research, queuing theory, sample survey theory and methods, stochastic networks and processes.

- Canterbury (Maths & Stats)

  Current: Differential equations, general relativity, global optimization, statistics.

  Possible: (Applied Maths) differential equations, dynamical systems, multivariate approximation, nonlinear relativity, water wave theory.

  (Pure Maths) combinatorics, cryptography, design and coding theory, ergodic theory, finite fields, finite and algebraic geometry, Fourier analysis, function spaces, functional analysis, graph theory, number theory, ring theory, water wave theory.

  (Statistics) applied statistics, Bayesian methods and inference with emphasis on prior information, empirical Bayes decision theory, heteroscedantic regression, probability theory, stochastic processes.

- Massey (Maths)

  Current: Combinatorics in phylogeny, diffusion of moisture through paint films, dynamic search and decision-making strategies, mathematics education, nonlinear network problems,

optimal pasture grazing strategies, transformation properties of differential equations, theoretical and numerical combustion, vehicle routing.

Possible: Deterministic operations research, algebraic geometry, applied differential equations in biology and chemistry, combinatorics and graph theory, differential geometry, facilities layout, fluid dynamics and geothermal modelling, graph theory, group theoretical techniques in differential equations, mathematics in education, vehicle routing.

- Massey (Statistics)

  Current: Decision trees, multivariate analysis, statistical ecology.

  Possible: Applied probability & stochastic processes, applied statistics and biometrics, Bayesian statistics, biased estimation in linear models, contingency tables, multivariate analysis, queuing theory, reliability theory, spatial data, surveys and data collection.

- Otago (Maths and Stats)

  Current: A constitutive equation for sea ice rheology, identification and nurture of talented mathematicians; interaction of waves and ice floes in the marginal ice zone, preschoolers and microcomputers, size-based sampling with resource selection studies, treatment allocation with multiple prognostic covariates.

  Possible: (Pure Mathematics) combinatorics, complex analysis, ergodic theory, graph theory, group theory, Hilbert space theory, homological algebra and ring theory, logic of empirical theories, measure theory, number theory, special functions, topological algebras.

  (Applied Mathematics) fluid dynamics and rheology, finite element methods, foundations of quantum theory, geophysical fluid dynamics and oceanography, mathematical computing (algebraic and logical), modelling of Antarctic and Arctic geophysical, numerical analysis, oceanographic and engineering processes, relativity.

  (Statistics) Bayesian inference network, compartmental analysis, data modelling, experimental design, medical statistics, multivariate analysis, nonparametric methods, operations research, statistical ecology, statistical inference, statistics in the pharmaceutical sciences, stochastic modelling, time series analysis.

- Victoria (Maths)

  Current: Modelling of geothermal flows.

  Possible: Chaotic dynamics, combinatorics - matroid theory and graph theory, global analysis, computable algebra, fluid mechanics (especially of drops and bubbles), fluid mechanics of surface and interfacial waves, geophysics (especially dynamics of plate tectonics), mathematical logic - general algebra, mathematical physics and non standard analysis, modelling of geothermal flows, recursion theory, singularity theory - robotics, topological and Lie groups.

- Victoria (Statistics & OR)

  Current: Models in communications, population modelling, stochastic models for rain fall.

  Possible: Applied statistics, operations research, stochastic processes, time series (with a special interest in queuing theory, seasonal adjustment, simulation, stochastic models in geophysics and metrology).

- Waikato (Maths & Stats)

  Current: Applied statistics, astrophysics, industrial modelling, symbolic computation.

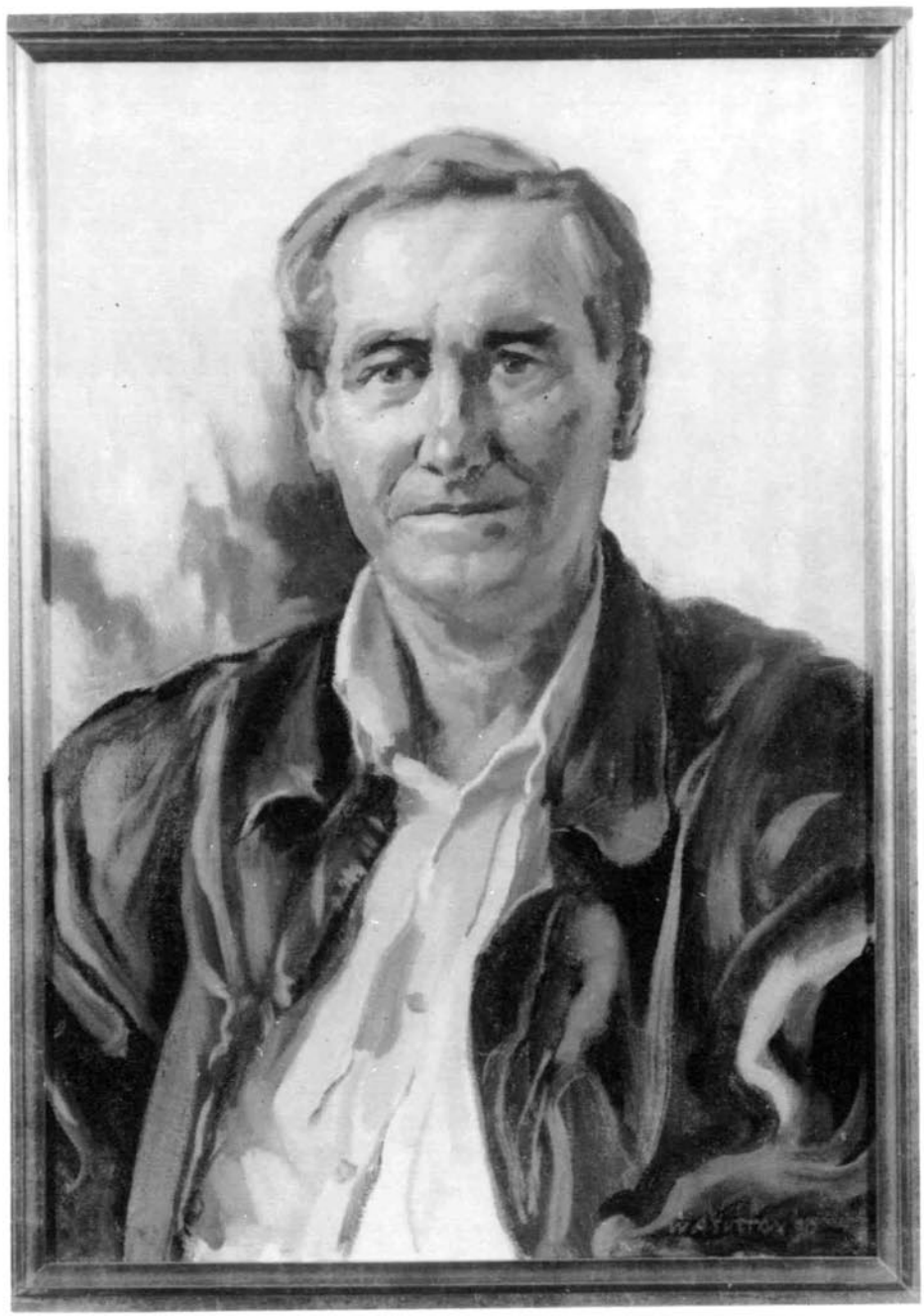
  Possible: Analysis, applied statistics, astrophysical and industrial magnetohydro-dynamics, combinatorics, constructive analysis, group theory, mathematics education, numerical analysis, symmetry properties of partial differential equations, symbolic computation.

Margaret J. Morton
Mathematics and Statistics
University of Auckland.

	LECTURING STAFF	DOCTORAL STUDENTS	FEES (1993)	CONTACT
Auckland (Maths & Stats)	48 (7) A (C, I), M, P/ED	10 (3) A (C, I), P/ED	NZ $1,400 OS $13,000	Professor Gaven Martin, Mathematics & Statistics Department, University of Auckland, Private Bag 92019, Auckland. Ph 64-9-373-7599 Ext 8740, Fax 64-9-373-7457, email martin@mat.auckland.ac.nz.
Canterbury (Maths & Stats)	26 (0) A (I, V), P/ED	7 (3) A (C), P/ED	NZ $1,300 OS $14,000	Dr Peter Renaud, Mathematics & Statistics Department, University of Canterbury, Private Bag 4800, Christchurch. Ph 64-3-364-2696 email pfr@math.canterbury.ac.nz.
Massey (Maths)	16 (2) A (C), P/ED	12 (4) A (C, I), P/ED	*NZ $1,400 *OS $13,000	Professor Graeme Wake, Mathematics Department, Massey University, Private Bag 11222 Palmerston North. Ph 64-6-350-5081 Fax 64-6-350-5611 email G.Wake@massey.ac.nz
Massey (Statistics)	12 (0) A (C), Af, P/ED, S	3 (0) P/ED	NZ $1,400 OS $13,000	Professor Jeffrey Hunter, Statistics Department, Massey University, Private Bag 11222, Palmerston North. Ph 64-6-350-5082 fax 64-6-350-5611 email j.hunter@massey.ac.nz.
Otago (Maths & Stats)	20 (0) A (C), P/ED	6 (3) A (C), P/ED	NZ (FT) $660 NZ (PT) $330 OS $13,000	Dr John Clark, Mathematics & Statistics Department, University of Otago, PO Box 56, Dunedin. Ph 64-3-479-7781 Fax 64-9-479-8427 email JClark@gandalf.otago.ac.nz.
Victoria (Maths)	14 (1) P/ED, M	1 (1)	NZ (FT) $1,410 NZ (PT) $846 OS $15,000	Dr Lindsay Johnston, Mathematics Department, Victoria University, PO Box 600, Wellington. Ph 64-6-472-1000 email johnstone@math.vuw.ac.nz.
Victoria (Stats & OR)	13 (3) A (I), J, P/ED	3 (0) A (C), P/ED	NZ $1,410 OS $15,000	Professor David Vere-Jones, Institute of Statistics & Operations Research, Victoria University, PO Box 600, Wellington. email dvj@isor.vuw.ac.nz.
Waikato (Maths & Stats)	16 (4) P/ED	9 (2) A (C), P/ED, Ma	NZ $1,365 OS $15,000	Associate Professor Alfred Sneyd, Mathematics & Statistics Department, University of Waikato, Private Bag 3105, Hamilton. email SNEYD@waikato.ac.nz.

Notes: Lecturing staff as listed in 1993 University Calendar. Auckland includes Tamaki campus. Number of females given in brackets.
A = Asian, Af = African, C = Chinese, I = Indian, J = Japanese, M = Maori, Ma = Malaysian, P/ED = Pakeha/European descent,
S = Sri Lankan, V = Vietnamese
Student numbers as of 15 May, 1993 - Waikato student numbers include M Phil students. Number of females given in brackets.
Fees - NZ = NZ rate available to NZ citizens and permanent residents, Australian citizens. OS = Overseas students not included in one of NZ categories. FT = fulltime, PT = part-time.
* Substantial reduction is available for research degrees, up to 50% on the figures quoted.

CENTREFOLD



Professor Roy Kerr

(Photo of a portrait by W A Sutton, 1991. Used with permission.)

ROY P KERR

by Brian Davis

Roy Kerr retired from his position as Professor of Mathematics at the University of Canterbury in February of this year. He had been in the Department for twenty-two years, and its Head for the past ten. In this note I shall record some of the facts and legends known and circulated about his life and career so far.

Roy first came to the attention of New Zealand's mathematical community in 1950, when as a pupil of St Andrew's College in Christchurch he sat the University Entrance Scholarship. In those days Scholarship Mathematics consisted of two papers, and was marked out of 600; Roy got 298. This disappointing result was almost entirely explained by the fact that he'd turned up in the afternoon for one of the papers when it had in fact been scheduled in the morning. Despite this oversight, he did get a scholarship, and in his first year at Canterbury College, attended the lectures for Stage III. Regulations, however, permitted him to sit only the stage II examinations. Next year he was sitting in on the Masters lectures.

His undergraduate career was not given wholly to mathematics and science; he admits to having played a lot of billiards, and in 1952 represented his College in boxing at the Easter Tournament, as a light-welterweight. I recall W.W. Sawyer, then a lecturer at Canterbury, expressing alarm and dismay over Roy's pugilism, on the ground that he didn't want the best brain he'd encountered in a student scrambled by a well-thrown punch; but history seems to confirm that Roy came to no lasting harm over it.

In 1955 he received a MSc with first class honours, and went to Cambridge with a Sir Arthur Sims Empire Scholarship. He was awarded a PhD in 1960, for a thesis on the equations-of-motion problem in general relativity. This work appeared in a series of three uncharacteristically long papers in *Nuovo Cimento*, and although later overshadowed by the Kerr metric, was extensively cited. He went on to a post-doctoral post at Syracuse University, and then to work with a US Air Force relativity group at Wright-Patterson Field, in Ohio. The USAF were interested in antigravity devices; one of the tasks of the relativity group was to assess and report on such devices proposed to it by inventors. Roy remarked to me once that these devices usually involved massive flywheels spinning at high speeds; most of the inventors specified that these flywheels be made of gold or platinum.

In 1962 Roy moved to the University of Texas in Austin, where a relativity group had been formed. In his first year he produced the work which led to the two-page article in *Phys Rev Letters* describing the Kerr metric. Here we enter the realm of legend. In an interview printed in the University of Canterbury *Chronicle* of 11 March (on which this article relies heavily), Roy says that, although he knew that his metric represented the gravitational field of a rotating star, he did not then realise how important it was going to be. Some insight on how the realisation dawned may be got from a lively if somewhat disingenuous article on the First Texas Symposium on Relativistic Astrophysics published in *Physics Today* (August 1989). Although this describes an interesting attempt to rob Roy of the fruits of his labours, which seems to indicate that they were thought to be valuable, it also says that Roy's paper was not in fact mentioned by the summarizers at the end of the conference. But when recognition came, it was emphatic. Chandrasekhar, in his Ryerson Lecture of 1978, said: "In my entire scientific life, extending over forty-five years, the most shattering experience has been the realization that an exact solution of Einstein's equations of general relativity, discovered by the New Zealand mathematician Roy Kerr, provides the *absolutely exact representation* of untold numbers of massive black holes that populate the universe".

Roy returned to New Zealand in 1971, to the chair he has just vacated. He brought to us in Canterbury a sharpened sense of belonging to the international mathematical community and attracted many visitors, but his major contribution to the Department began when in 1983, after Gordon Petersen's early retirement, he took over the headship. Roy's style as HOD was at once uncompromising and dashing; in a series of moves which affronted some of our colleagues in other departments, who had grown comfortable with the traditional Canterbury view that Mathematics should be a low-cost department devoted to service teaching, he contrived to reduce student-staff ratios, encourage research, and equip the department with a computer system at the sort of cost hitherto associated with spectrographs. Morale rose markedly. In many respects Roy was an unusual figure in University administration; he had very little patience for the practice of wrapping self-interest up in politically correct pieties, and was perfectly willing to offend entrenched privilege. But he was successful, and we are the better for his efforts, and we love him for them.

Roy has received many awards, culminating in the Hughes Medal of the Royal Society of London in 1984, and has given many invited lectures. His retirement comes at a time when his remarkable faculties seem unimpaired. He has put it about that he will sail the seven seas in the ocean-going yacht he has recently bought. Perhaps new legends will arise; we await with interest, and wish him success and happiness.

SECRETARIAL

MINUTES OF THE THIRTY-SECOND COUNCIL MEETING
Wednesday 25 November 1992

The meeting was held via teleconference and began at 10:00 a.m.

"PRESENT": Robert Aldred, Robert Chan, Marston Conder, Mike Hendy, Derek Holton (Chair), David Robinson, Kee Teo, Graham Weir.

APOLOGIES: Margaret Morton, Ingrid Rinsma.

1. MINUTES OF THE THIRTY-FIRST COUNCIL MEETING:

   After a minor alteration was accepted, it was moved from the chair that the minutes of the previous meeting be accepted as a true and accurate record. The motion was carried without dissent.

2. REPORTS:

   (a) TREASURER: Kee Teo reported on the state of the Society's funds. The ongoing problems with the IRD were mentioned and it was suggested that further assistance be sought from the RSNZ in this matter.

   It was moved from the chair that the Society make a grant of $1500 to the Colloquium to be held at Canterbury in August and that $2000 be granted to the New Zealand Journal of Mathematics. The motion was carried.

   It was moved from the chair that unused funds allocated to the visiting lecturer should be put toward the $250 for the the 1993 Thesis Competition. The motion was carried.

   It was also agreed that the Thesis competition should be brought to the attention of all students who would be eligible to submit their theses for consideration.

   (b) MEMBERSHIP: It was reported that the Society's membership had remained steady in 1992.

   (c) PUBLICATIONS: Nil report.

   (d) NEWSLETTER: Nil report.

3. APPLICATIONS FOR FINANCIAL ASSISTANCE:

   Research, conference and travel support applications were received and discussed. Following these discussions it was decided that

   - Mike Charleston, a Ph.D. student from Massey University, should be granted $430 toward the cost of attending two conferences in Australia.
   - Ken Louie, a post-doctoral fellow at Massey University, be granted $500 toward the cost of attending the Australian Applied Mathematics Conference in Hahndorf, Adelaide, Australia.
   - Colin Fox, a lecturer at Auckland University, be granted $300 toward the cost of attending the Ice Technology Conference in Boston.

   In addition to these grants it was decided to grant $500 to the New Zealand Mathematics Olympiad Committee to be used as appropriate in their preparation of teams to compete in the event.

4. NEW ZEALAND JOURNAL OF MATHEMATICS:

A report on the activities of the Journal was read by Derek Holton. In addition to this report mention was made of the ongoing G.S.T./subscription collecting problem. It was suggested that the mechanics of the problem be sorted out between David Alcorn and John Shanks.

5. FOSTS AND RSNZ:

It was reported that FOSTS had been relatively quiet for some time and would probably remain so while the RSNZ is being restructured. An interim board is being established to represent the interests of associated bodies. A call will be made for nominations for representatives to sit on the board. A discussion of this situation took place.

It was moved from the chair that Derek Holton should write to all likely groups to offer the possibility of gaining representation on board. The motion was passed.

6. APPLIED MATHEMATICS GROUP:

Graham Weir reported that the Applied Mathematics Group had moved to Gracefield and that a reasonable amount of goodwill had been experienced in that time. Consequently feelings within the group are more positive than they were a few months ago.

7. NZMS POLICY:

No further comments or suggestions have been received regarding the NZMS Policy Statement. The situation will be considered further before the next AGM.

8. COUNCIL NOMINATIONS:

The council was reminded that there were several positions becoming vacant on the council, including those of treasurer and secretary. The desirability of receiving nominations early enough to circulate the details of the nominees was also mentioned.

9. NZMS VISITING LECTURER:

A report from John Loxton, the 1992 visiting lecturer, was circulated to the meeting.

Details for the 1993 visiting lecturer, Andreas Dress, are as yet uncertain although March/April 1993 is the most likely time. Mike Hendy will work on the itinerary as soon as firm dates are available. Nominations for the 1994 visiting lecturer should be made as soon as possible.

10. FORDER LECTURER:

The Forder lecturer for 1993, Roger Penrose, will be coming in April/May of 1993. After some initial problems with organization, the details of the trip are now moving along. Every effort will be made to avoid conflict between the visit of Andreas Dress and that of Roger Penrose.

11. NZMS RESEARCH AWARDS:

Derek Holton reported that he had received five nominations for the 1993 Awards. It was also noted that the publicity gained from the previous awards had been less than anticipated. A follow-up on this will be made.

12. AITKEN CELEBRATIONS:

Plans for the Aitken celebration are moving along but exact dates for the conference are yet to be set. It will probably be held in August of 1995 but moves to semesters and other activities planned for that time may effect the timing of the event. Stay tuned for further updates.

13. JIM CAMPBELL TEACHING AWARDS:

The Jim Campbell Teaching Awards are to be considered by NZAMT. David Robinson will attend the NZAMT Council meeting and report on any developments.

14. ANY OTHER BUSINESS:

(a) An offer was made by Margaret Morton to produce an article for the NZMS Newsletter detailing the makeup of each mathematics/statistics department and indicating what prospective students might encounter should they choose to study there (e.g. ethnicity/gender breakdown of faculty, postgraduate programs in place, financial assistance available etc.). The offer was gratefully accepted.

(b) David Robinson reported on mathematics at Lincoln University indicating that the mathematics program there is highly application orientated. It was suggested that their department be kept informed of visiting mathematicians/speakers who might be available to give seminars etc.

(c) Mention was made of the recent round of PGSF/FoRST research grant applications. A discussion ensued after which it was decided to report further in August.

(d) A letter has been received calling for nominations for a Saudi Arabian Science Award. The Research Awards Committee will be approached to consider possible nominations.

The meeting closed at 11:16 a.m.

MATHEMATICAL VISITORS TO NEW ZEALAND

List No. 35 : 1 July 1993

One of the main purposes of this list is to enable other institutions to invite visitors to spend time with them. Anyone wishing to issue such an invitation should do so through the principal contact person.

The information for each item is arranged as follows:

Name of visitor; home institution; whether accompanied; principal field of interest; dates of visit; principal host institution; principal contact person; comments.

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Prof Glen Anderson; Michigan State University; wife and child; Complex Analysis; January to July 1994; University of Auckland; Assoc-Prof M. K. Vamanamurthy.

Dr Philippe Chartier; Universitaire de Beaulieu, France; wife and children; Numerical Analysis; 9/93 - 9/94; University of Auckland; Professor John Butcher.

Dr Tony Cole; The University of Melbourne, Australia; unaccompanied; Minimal Network Theory; July 1993 to January 1994; University of Auckland.

Professor Richard Cormack; University of St Andrews, Scotland; statistics; December 1993; University of Otago; Prof Bryan Manly.

Dr Larry Cox; US Environmental Protection Agency; statistics; December 1993; University of Otago; Prof Bryan Manly.

M. Fellows; University of Victoria, B.C. Canada; combinatorics, complexity, theoretical computer science; second half 1993; R. Downey; Victoria University of Wellington; probable.

Dr J. Gao; University of Science and Technology of China; unaccompanied; Statistics; 1.2.94. to 31.1.95; University of Auckland; Professor George Seber.

Prof. Fred Gehring; University of Michigan; wife; Complex Analysis; February to May 1994; University of Auckland; Professor Gaven Martin.

Professor Ken Goodearl; University of California Santa Barabara; wife (Professor Birge Zimmermann q.v.); noncommutative ring theory; December 1993; University of Canterbury; Dr Kevin O'Meara.

Professor Robert Hemminger; Vanderbilt University, Nashville, Tennessee, USA, unaccompanied, graph theory, July to December 1993; University of Otago; Prof. Derek Holton.

Professor John Herzog; Pacific Lutheran University; statistics; September to December 1993; University of Canterbury; Prof J. J. Deely

Professor Peter Hilton; SUNY at Binghamton, New York, USA; accompanied by Prof. Jean Pedersen (q.v.); nilpotent group theory and nilpotent homotopy theory algebraic topology, homological algebra, categorical algebra and maths education; September to December 1993; University of Otago; Prof. Derek Holton.

Mr Karel In t'Hout; University of Leiden; numerical solution of differential equations; September 1992 - September 1993; University of Auckland; Prof. John Butcher.

Professor Don James; Pennsylvania State University; Algebra ; January to June 1994; University of Auckland; Professor Peter Lorimer/Dr Margaret Morton.

S. Lempp; Univ. of Wisconsin, Madison; recursion theory; January 1994, for two weeks; Victoria University of Wellington; R. Downey; probable; supported by NSF under a US/NZ binational grant.

Professor W. A. Light; Leicester University, U.K.; approximation theory and numerical analysis; July to October 1993; University of Canterbury; Dr R. K. Beatson; Visiting Erskine Fellow.

Professor C. C. Lindner; Auburn University, Alabama; accompanied by wife; combinatorics, Steiner triple systems; second term 1993; University of Canterbury; Dr D.R. Breach; Visiting Erskine Fellow.

Dr Colin Maclachlan; University of Aberdeen, Scotland; accompanied by wife (Dorothy); group theory and topology; February - May 1994; University of Auckland; A/Prof Marston Conder.

Dr Lyman McDonald; WEST Inc, Denver USA; statistics; December 1993; University of Otago; Prof Bryan Manly.

Professor Jean Pedersen; Santa Clara University, California, USA; accompanied by Prof Peter Hilton (q.v.); geometry, combinatorics, number theory, mathematics education; September to December 1993; University of Otago; Prof. Derek Holton.

Professor Mary Ellen Rudin; University of Wisconsin; husband; topology; February to March 1994; University of Auckland; Assoc-Prof Ivan Reilly/Professor David Gauld.

Professor Walter Rudin; University of Wisconsin; wife; complex analysis; February to March 1994; University of Auckland; Assoc-Prof Ivan Reilly/Professor David Gauld.

R. Shore; Cornell University; recursion theory; January 1994, for two weeks; Victoria University of Wellington; R. Downey; probable; supported by NSF under a US/NZ binational grant.

Dr Peter J. Smith; Royal Melbourne Institute of Technology; family; statistics; end June - Dec 1993; University of Auckland; Professor Alastair Scott.

Dr Michael Stiassnie; Technion, Israel Institute of Technology; accompanied by wife; ocean wave dynamics, fractal analysis; March 1993 to August 1993; University of Canterbury; Dr Peter Bryant; Visiting Erskine Fellow.

M. Stob; Calvin College; recursion theory; January 1994, for two weeks; Victoria University of Wellington; R. Downey; probable; supported by NSF under a US/NZ binational grant.

Professor Takeshi Sugimoto; Saitama Inst. of Technology; 1 April 1993 to 31 May 1994; University of Waikato; Assoc. Prof. Alfred Sneyd.

Professor M. H. Taibleson; Washington University; Analysis; May to August 1994; University of Canterbury; Dr H-Q Bui; Visiting Erskine Fellow.

Professor Roland Thomas; Carleton University, Ottawa, Canada; accompanied by wife and son, statistics; September 1993 to May 1994; University of Auckland; Prof. Alastair Scott.

Dr Nicholas Tufillaro; Center for Non-linear Studies, Los Alamos National Laboratory, New Mexico; chaos; June 14 to December 17 1993; University of Otago; Professor Vernon Squire; temporary lectureship

Professor Andrew Vince; University of Florida; wife and child; graph theory; July 1993 - July 1994; Massey University; Dr Charles Little; possible.

Dr Nicholas Dudley Ward; United Kingdom; analysis; April 19 to August 6 1993; University of Otago; Peter Fenton; temporary lectureship.

Professor Steve Watson; York University, Toronto; wife and child; topology; January to February 1994; University of Auckland; Assoc-Prof Ivan Reilly/Dr David McIntyre.

Professor Birge Zimmermann; University of California Santa Barbara; husband (Professor Ken Goodearl q.v.); noncommutative ring theory; December 1993; University of Canterbury; Dr Kevin O'Meara.

CONFERENCES IN NEW ZEALAND

When arranging visits it might be useful to remember the following:

NZ Mathematics Colloquium; University of Canterbury; 22 to 26 August 1993

NZAMT Conference 'Maths with Class'; University of Canterbury; August 29 - September 2 1993
Invited Speakers:
Professor Maria Klawe; Dept of Computer Science, University of British Columbia, Canada
Professor Stanley Bezuszka; Mathematics Institute, Boston College, Chestnut Hill, Mass. USA
Mr Charles Lovitt, Montrose, Vic. Australia
Ms Grace Coates; c/o EQUALS, University of California, Berkeley, Calif. USA
Professor Peter Hilton (see main list)
Professor Jean Pedersen (see main list)
Mr Alan Rogerson, Hawthorn, Vic. Australia
Mr Tony Gardiner, University of Birmingham, UK
Mary Barnes, Cremorne, NSW, Australia
(Contact for all the above, Bill Ellwood, President NZAMT, Burnside High School, Greers Rd Christchurch 5)
Analucia Schliemann, Jaboatao, Brazil
(Contact Kay Irwin, Education Department, University of Auckland)

Statistics in Ecology and Environmental Modelling. Centre for Applications of Statistics and Mathematics; University of Otago 13 - 17 December 1993

20th Australasian Conference on Combinatorial Mathematics and Combinatorial Computing; University of Waikato; 5 to 9 December 1994.

Please note: Production of these lists is dependent on my receiving information. When you know about a visit (whether it be definite, very likely, or possible), would you please forward the details to me at the earliest convenient time. Thank you.

David Robinson
N.Z. Mathematical Society Visitors' Co-ordinator
Department of Mathematics
Private Bag 4800
University of Canterbury
email: dfr@math.canterbury.ac.nz

CONFERENCES

** 1993 **

August 23-24 (Auckland) **29th Annual Operations Research Conference**
Contact Andrew Philpott, Department of Engineering Science, University of Auckland, Private Bag 92019, Auckland, New Zealand.
e-mail: a.philpott@auckland.ac.nz

August 23-26 (Christchurch) **1993 New Zealand Mathematics Colloquium**
Contact Peter Renaud, Department of Mathematics, University of Canterbury, Private Bag 4800, Christchurch, New Zealand.

August 25-27 (Christchurch) **1993 New Zealand Statistical Association Conference**
Contact NZSA Conference Secretary, Mathematics Department, University of Canterbury, Private Bag 4800, Christchurch 8001, New Zealand.

August 29-September 2 (Christchurch) **Maths with Class - NZAMT Biennial Conference**
Contact The Conference Secretary, "MATHS WITH CLASS", Centre for Continuing Education, University of Canterbury,Private Bag 4800, Christchurch, New Zealand.

September 27-October 1 (Wollongong, Australia) **Statistics '93 (incorporating STATCOMP '93)**
Contact Statistics '93 Conference Secretary, Department of Mathematics, University of Wollongong, Northfield Avenue, Wollongong, NSW 2522, Australia.
email: statconf@udw.edu.au

December 1-3 (Kyoto, Japan) **Linear Operators and Inequalities**
Contact Tsuyushi Ando, Research Inst. for Electronic Science, Hokkaido University, Kita-ku Sapporo 060, Japan.

December 5-9 (Hawaii) **1993 International Sympsoium on Nonlinear Theory and its Applications**
Contact Shun-ichi Amari, Faculty of Engineering, University of Tokoyo, Bunkyo-ku, Tokyo, 113 Japan.
email: amari@sat.t.u-tokyo.ac.jp

December 5-11 (Oberwolfach, Germany) **Dynamical Zeta Functions**
Contact MFOG: see (1) below.

December 5-11 (Oberwolfach, Germany) **Model Selection**
Contact MFOG: see (1) below.

December 6-10 (Perth, Western Australia) **International Congress on Modelling and Simulation**
Contact Michael McAleer, Department of Economics, University of Western Australia, Nedlands, WA 6009, Australia.

December 8-10 (Kyoto, Japan) **Mathematical Structure of Optimization Theory**
Contact Jun-ichi, Nakagami, Faculty of Science, Chiba University, Chiba-shi Chiba 263, Japan.

December 12-18 (Oberwolfach, Germany) **General Principles of Discretization Algorithms, Theory, and Applications**
Contact MFOG: see (1) below.

December 12-18 (Oberwolfach, Germany) **Methoden und Verfahren der Mathematischen Physik**
Contact MFOG: see (1) below.

December 13-14 (Queenstown, New Zealand) **2nd International Conference on Financial Econometrics**
Contact David Giles, Economics, University of Canterbury, Private Bag 4800, Christchurch, New Zealand.
email: d.giles@csc.canterbury.ac.nz

December 13-15 (Cirencester, UK) **4th IMA Conference on Cryptography and Coding**
Contact IMA: see (7) below.

December 13-17 (Dunedin) **Conference on Statistics in Ecology and Environmental Monitoring**
Contact Centre for Applications of Statistics and Mathematics, University of Otago, PO Box 56, Dunedin, New Zealand.
email: CASM@math.otago.ac.nz

December 13-17 (Raleigh, North Carolina) **International Cornelius Lanczos Centenary Conference**
Contact Robert J. Plemmons, Department of Mathematics and Computer Science, Box 7388, Wake Forest University, Winston-Salem, North Carolina 27109, U.S.A.

December 15-17 (Kyoto, Japan) **Groups and Related Topics**
Contact Masahiko Miyamoto, Ehime University, Matsuyama Ehime 790, Japan.

December 20-22 (Egham, Surrey) **EURO-COLT '93: Conference on Computational Learning Theory**
Contact IMA: see (7) below.

** 1994 **

January 1-7 (Calcutta) **International Symposium on Mathematical Physics with Special Sessions on Bose's Works**
Contact Professor B. N. Mandal, S. N. Bose School of Mathematics and Mathematical Sciences, Calcutta Mathematical Society, AE-374, Sector 1, Salt Lake City, Calcutta - 700 064, India.

January 2-8 (Oberwolfach, Germany) **Modell Theorie**
Contact MFOG: see (1) below.

January 4-7 (Tobago, West Indies) **International Symposium on Visco-Elastic Fluids**
Contact H. Ramkissoon, Dept. of Mathematics, The University of the West Indies, St. Augustine, Trinidad, West Indies.

January 4-8 (Caracas, Venezuela) **International Conference on Harmonic Analysis and Operator Theory**
Contact Comité Organizador Conterencia Cotlar, Apartado 47.898 Caracas, 1041-A, Venezuela.
email: wurbina@dino.conicit.ve

January 5-7 (Hobart) **Conference on Semigroup Theory**
Contact Dr. P. G. Trotter, Department of Mathematics, University of Tasmania, Hobart 7001, Tasmania, Australia.

January 9-15 (Oberwolfach, Germany) **Algebraic Combinatorics: Association Schemes and Representation Theory**
Contact MFOG: see (1) below.

January 10-12 (Kyoto, Japan) **Nonlinear Partial Differential Equations**
Contact Takaaki Nishida, Faculty of Science, Kyoto University, Sakyo-ku Kyoto 606-01, Japan.

January 17-19 (Kyoto, Japan) **Structure and Statistical Law of Turbulence**
Contact RIMS: see (4) below.

January 23-29 (Oberwolfach, Germany) **Singulare Integral und Pseudo-Differential-Operatoren und Ihre Anwendungen**
Contact MFOG: see (1) below.

January 24-28 (Kyoto, Japan) **Complex Anaysis on Hyperbolic 3-Manifolds**
Contact Katsuhiko Matsuzaki, Tokyo Institute of Technology, Meguro-ku Tokyo 152, Japan.

January 24-28 (Minneapolis, Minnesota) **IMA Workshop on Mathematical Population Genetics**
Contact IMA: see (3) below.

January 30-February 5 (Oberwolfach, Germany) **Nichtstandardanalysis und Anwendungen**
Contact MFOG: see (1) below.

February (Laurentian Mountains, Canada) **Workshop on Dynamical Disease**
Contact CRM: see (9) below.

February 2-4 (Vienna) **IMACS Symposium on Mathematical Modelling**
Contact I. Troch, Inst. für Analysis, Technische Mathematik und Versicherungsmathematik, TU Wien, Wiedner Hauptstr. 8-10, A-1040 Wien, Austria.

February 6-12 (Oberwolfach, Germany) **C*-Algebren**
Contact MFOG: see (1) below.

February 13-19 (Oberwolfach, Germany) **Funktionentheorie**
Contact MFOG: see (1) below.

February 20-26 (Oberwolfach, Germany) **Harmonische Analyse und Darstellungstheorie Topologischer Gruppen**
Contact MFOC: see (1) below.

February 27-March 5 (Oberwolfach, Germany) **Mathematical Economics**
Contact MFOG: see (1) below.

February 28-March4 (Minneapolis, Minnesota) **IMA Workshop on Stochastic Networks**
Contact IMA: see (3) below.

March 6-12 (Oberwolfach, Germany) **Mathematische Stochastic**
Contact MFOG: see (1) below.

March 13-19 (Oberwolfach, Germany) **Elementare und Analytische Zahlentheorie**
Contact MFOG: see (1) below.

March 20-26 (Oberwolfach, Germany) **Regelungstheorie**
Contact MFOG: see (1) below.

March 27-April 2 (Oberwolfach, Germany) **Algebraische Gruppen**
Contact MFOG: see (1) below.

March 27-April 2 (Oberwolfach, Germany) **Endliche Modelltheorie**
Contact MFOG: see (1) below.

March 28-30 (Kyoto, Japan) **Moduli Spaces, Galois Representations and L-Functions**
Contact RIMS: see (4) below.

April 5-11 (Santander, Spain) **Effective Methods in Algebraic Geometry (MEGA '93)**
Contact T. Recio, Dept. de Mat., Estadistica y Computation, Universidad de Cantabria, E-39071 Santander, Spain.

April 10-16 (Oberwolfach, Germany) **Numerical Linear Algebra with Applications**
Contact MFOG: see (1) below.

April 17-23 (Oberwolfach, Germany) **Designs and Codes**
Contact MFOG: see (1) below.

April 24-26 (Manhattan, Kansas) **Conference on Applied Statistics in Agriculture**
Contact James R. Schwenke, Kansas State University, Department of Statistics, Dickens Hall, Manhattan, Kansas 66506-0802, U.S.A.

April 24-30 (Oberwolfach, Germany) **Geschichte der Mathematik**
Contact MFOG: see (1) below.

May 1-7 (Oberwolfach, Germany) **Gruppentheorie**
Contact MFOG: see (1) below.

May 2-6 (Minneapolis, Minnesota) **IMA Workshop on Image Models (and their Speech Model Cousins)**
Contact IMA: see (3) below.

May 2-6 (Hamilton, Ontario) **International Conference on Topological Vector Spaces, Algebras and Related Areas**
Contact E. T. Sawyer, Dept. of Math. and Stats., McMaster University, Hamilton, Ontario, Canada L85 4K1.
email: sawyer@mcmaster

May 8-14 (Oberwolfach, Germany) **Variationsrechnung**
Contact MFOG: see (1) below.

May 15-21 (Oberwolfach, Germany) **Critical Phenomena in Spatial Stochastic Models**
Contact MFOG: see (1) below.

May 16-20 (Minneapolis, Minnesota) **IMA Workshop on Stochastic Models in Geosystems**
Contact IMA: see (3) below.

May 16-20 (Marseille, France) **Géométrie Algébrique**
Contact CIRM: see (8) below.

May 22-28 (Oberwolfach, Germany) **Diskrete Geometrie**
Contact MFOG: see (1) below

May 24-27 (Isle of Rügen, Germany) **Conference on Hermann G. Grassman (1809-1877)**
Contact G. Schubring, Institut Für Didaktik der Mathematik, Universität Bielefeld, Postfach 100131, D-W 4800 Bielefeld, Germany.

May 29-June 4 (Oberwolfach, Germany) **Singulare Storungsrechung**
Contact MFOG: see (1) below.

May 30-June 4 (Haifa, Israel) **Workshop on Group Representation Theory**
Contact D. Chillag, Dept. of Mathematics, Technion, Israel Institute of Technology, Haifa 32000, Israel.
email: math555@technion,bitnet

May 31-June 3 (Minneapolis, Minnesota) **IMA Minisymposium on Phase Transitions in Catalytic Surface Reaction Models**
Contact IMA: see (3) below.

June 1-7 (Sant Feliu de Guíxols, Spain) **1994 Barcelona Conference on Algebraic Topology**
Contact 1994 BCAT, CRM, Apartat 50, 08193 Bellaterra, Centre de Recerca Matemàtica Institut d'Estudis Catalans, Barcelona, Spain.

June 5-10 (Alicante, Spain) **5th Valencia International Meeting on Bayesian Statistics**
Contact Professor Jose M. Bernado, centro de Documentacion y Analisis, Presidencia de la Generalidad, Caballeros 9, 46001-Valencia, Spain.

June 12-18 (Oberwolfach, Germany) **Nichtlinearitaten vom Hysteresistyp**
Contact MFOG: see (1) below.

June 13-17 (Stony Brook, New York) **5th International Conference on Hyperbolic Problems Theory, Numerical Methods and Applications**
Contact T. Mills, Dept. of Applied Mathematics, University at Stony Brook, Stony Brook, New York 11794-3600, U.S.A.

June 13-17 (Minneapolis, Minnesota) **IMA Workshop on Classical and Modern Branching Processes**
Contact IMA: see (3) below.

June 19-25 (Oberwolfach, Germany) **Quantenmechanik von Vielteilchen Systemen**
Contact MFOG: see (1) below.

June 19-25 (Oberwolfach, Germany) **Integrable Systems from a Quantum Point of View**
Contact MFOG: see (1) below.

June 20-24 (Marseilles, France) **Probabilités Quantiques**
Contact CIRM: see (8) below.

June 26-July 2 (Oberwolfach, Germany) **Graphentheorie**
Contact MFOG: see (1) below.

July 3-9 (Oberwolfach, Germany) **Analysis und Geometrie Singuläre Räume**
Contact MFOG: see (10 below.

July 4-8 (Armidale, New South Wales) **38th Annual Meeting of the Australian Mathematical Society**
Contact Dr C. Radford, Department of Mathematics, Statistics and Computing Science, University of New England, Armidale, NSW 2351, Australia.

July 5-29 (Minneapolis, Minnesota) **IMA Summer Program on Molecular Biology**
Contact IMA: see (3) below.

July 10-16 (Oberwolfach, Germany) **Freie Randwertprobleme**
Contact MFOG: see (1) below.

July 11-15 (Atlanta, Georgia) **14th IMACS World Congress on Computational and Applied Mathematics**
Contact W. F. Ames, World Congress 14, School of Mathematics, Georgia Institute of Technology, Atlanta, GA 30332-0160, U.S.A.

July 12-22 (Durham, UK) **Geometry and Cohomology in Group Theory**
Contact P. H. Kropholler, School of Mathematical Sciences, Queen Mary and Westfield College, Mile End Road, London E1 4NS, U.K.
email: p.h.kropholler@qmw.ac.uk

July 17-23 (Oberwolfach, Germany) **Algebraische Zahlentheorie**
Contact MFOG: see (1) below.

July 17-23 (Marseilles, France) **Conférence Internationale de Topologie**
Contact CIRM: see (8) below.

July 24-30 (Oberwolfach, Germany) **Complex Geometry: Moduli Problems**
Contact MFOG: see (1) below.

July 25-29 (Marseille, France) **Representation des Groupes Reductifs p-adiques**
Contact CIRM: see (8) below.

July 25-30 (Marrakesh, Morocco) **4th International Conference on Teaching Statistics (ICOTS 4)**
Contact Mr El Ghazali Abdelaziz, Chair of the Local Organizing Committee, INSEA, PO Box 6217, Rabat-Instituts, Rabat, Morocco.

July 31-August 6 (Oberwolfach, Germany) **Mechanics of Materials**
Contact MFOG: see (1) below.

August 1-5 (Chiba, Japan) **3rd World Congress on Computational Mechanics**
Contact T. Kawai, WCCM III Office, Dept. of Electrical Engineering, Science University of Tokyo, 1-3 Kagurazaka, Shijukuku, Tokyo 162, Japan.

August 3-11 (Zürich, Switzerland) **The International Congress of Mathematicians 1994**
Contact R. Jeltsch, Seminar für Angewandte Mathematik, ETH, CH-8092 Zürich, Switzerland.

August 7-13 (Oberwolfach, Germany) **Effiziente Algorithmen**
Contact MFOG: see (1) below.

August 13-17 (Plovdiv, Bulgaria) **Third Colloquium on Numerical Anaysis**
Contact Secretary Stoyan Zlatev, Mathematical Faculty of the Plovdiv University, Tsar Assen Str. 24, Plovdiv 4000, Bulgaria.

August 14-20 (Oberwolfach, Germany) **Nonlinear Evolution Equations**
Contact MFOG: see (1) below.

August 15-19 (Ann Arbor, Michigan) **15th International Symposium on Mathematical Programming**
Contact 15th International Symposium on Mathematical Programming Conferences and Seminars, 541 Thomson Street, Room 112, University of Michigan, Ann Arbor, MI 49109-1360, U.S.A.

August 18-23 (Plovdiv, Bulgaria) **Fifth Colloquium on Differential Equations**
Contact Secretary Stoyan Zlatev, Mathematical Faculty of the Plovdiv University, Tsar Assen Str. 24, Plovdiv 4000, Bulgaria.

August 18-25 (Pusan, South Korea) **3rd International Conference on the Theory of Groups (Groups-Korea 1994)**
Contact Professor Ann Chi Kim, Department of Mathematics, Pusan National University, South Korea.
email: ackim@hyowon.pusan.ac.kr.

August 20-26 (Shijiazhuang, China) **International Conference on Rings and Radicals**
Contact Y. S. Zhu, Hebei Teachers University, Dept. of Math., Shijiazhuang, China 050016.

August 21-27 (Oberwolfach, Germany) **Mathematical Models in Phase Transitions**
Contact MFOG: see (1) below.

August 28-September 3 (Oberwolfach, Germany) **Komplexe Analysis**
Contact MFOG: see (1) below.

September 4-10 (Oberwolfach, Germany) **Topologie**
Contact MFOG: see (1) below.

September 11-17 (oberwolfach, Germany) **Homotopietheorie**
Contact MFOG: see (1) below.

September 18-24 (Oberwolfach, Germany) **Risk Theory**
Contact MFOG: see (1) below.

September 19-23 (Marseille, France) **3ème Atelier International de Théorie des Ensembles**
Contact CIRM: see (8) below.

September 25-October 1 (Oberwolfach, Germany) **Mathematical Methods in Tomography**
Contact MFOG: see (1) below.

October 2-8 (Oberwolfach, Germany) **Randelementenmethoden: Anwendungen and Fehleranalysis**
Contact MFDG: see (1) below.

October 16-22 (Oberwolfach, Germany) **Geometrie**
Contact MFOG: see (1) below.

October 30-November 5 (Oberwolfach, Germany) **Finite Volume Methods**
Contact MFOG: see (1) below.

November 13-19 (Oberwolfach, Germany) **Komplexitätstheorie**
Cotact MFOG: see (1) below.

November 20-26 (Oberwolfach, Germany) **Mathematical Aspects of Computational Fluid Dynamics**
Contact MFOG: see (1) below.

December 5-9 (Hamilton, New Zealand) **Twentieth Australasian Conference on Combinatorial Mathematics and Combinatorial Computing**
Contact Professor Les Foulds, Department of Management Systems, University of Waikato, Private Bag 3105, Hamilton, New Zealand.

December 18-23 (Oberwolfach, Germany) **Asymptotic Hochdimensionaler Statisticher Modelle**
Contact MFOG: see (1) below.

** **1995** **

(Italy) **Second International Conference on Numerical Methods for Volterra and Delay Equations (A conference to celebrate the 100th anniversary of Volterra's birth.)**
Contact A. Feldstein, Dept. of Math., Arizona State University, Tempe, Arizona 85287, U.S.A.

April 23-25 (Manhattan, Kansas) **Conference on Applied Statistics in Agriculture**
Contact James R. Schwenke, Kansas State University, Department of Statistics, Dickens Hall, Manhattan, Kansas 66506-0802, U.S.A.

** **1996** **

April 28-30 (Manhattan, Kansas) **Conference on Applied Statistics in Agriculture**
Contact James R. Schwenke, Kansas State University, Department of Statistics, Dickens Hall, Manhattan, Kansas 66506-0802, U.S.A.

Special Contact Addresses:

(1) **MFOG:** Mathematisches Forschungsinstitut Oberwolfach Geschäftstelle, Alberstrasse 24, W-7800 Freiburg in Breisgau, Germany.

(2) **MSRI:** I. Kaplansky, Director, MSRI, 1000 Centennial Drive, Berkeley, California 94720, U.S.A.

(3) **IMA:** Institute for Mathematics and its Applications, University of Minnesota, 514 Vincent Hall, 206 Church Street S.E., Minneapolis, Minnesota 55455, U.S.A.

(4) **RIMS:** Research Institute for Mathematical Sciences, Kyoto University, Kitashirakawa, Sakyo-ku, Kyoto 606, Japan.

(5) **ICTP:** International Centre for Theoretical Physics, P.O. Box 586, 34100 Trieste, Italy.

(6) **SIAM:** SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, Pennsylvania 19104-2688, U.S.A.

(7) **IMA:** Miss Pamela Irving, Conference Officer, The Institute of Mathematics and its Applications, 16 Nelson Street, Southend-on-Sea, Essex SS1 1EF, England.

(8) **CIRM**: Centre International de Rencontres Mathematiques, Case 916, Luminy, 70 Route Leon-Lachamp, 13288 Marseille, Cedex 9, France.

(9) **CRM:** S. Chenevert, Centre de Recherches Mathématiques, Université de Montréal, CP 6128-A, Montréal, Quebec H3C 3J7, Canada.

(10) **FIRMS:** E. Reidt, The Fields Institute for Research in Mathematical Sciences, 185 Columbia St. West, Waterloo, Ontario N2L 5Z5, Canada.

M.R. Carter

ELECTRONIC MAIL ADDRESSES FOR NZ MATHEMATICIANS

This list covers Mathematics and Statistics departments at all NZ Universities together with some NZ research centres

UNIVERSITY OF AUCKLAND

Private Bag 92019, Auckland. Telephone: (09) 373-7999.

Department of Mathematics and Statistics

Telephone: Extn 8743. Facsimile: (09) 373-7457.

ALCORN	David	8777	d_alcorn@mat.aukuni.ac.nz
AN	Jianbei	8773	j_an@mat.aukuni.ac.nz
ASHTON	Kenneth	8774	k_ashton@mat.aukuni.ac.nz
BAILLIE	Judy	5750	j_baillie@mat.aukuni.ac.nz
BALEMI	Andrew	5713	a_balemi@mat.aukuni.ac.nz
BARTON	Bill	8779	b_barton@mat.aukuni.ac.nz
BELL	Bill		
BROWN	Constance	5756	c_brown@mat.aukuni.ac.nz
BUTCHER	John	8747	j_butcher@mat.aukuni.ac.nz
CALVERT	Bruce	8780	b_calvert@mat.aukuni.ac.nz
CHAN	Robert	8783	r_chan@mat.aukuni.ac.nz
CONDER	Marston	8753	m_conder@mat.aukuni.ac.nz
DIXIT	Ganesh	8775	g_dixit@mat.aukuni.ac.nz
ELLIS	Jill	8605	j_ellis@mat.aukuni.ac.nz
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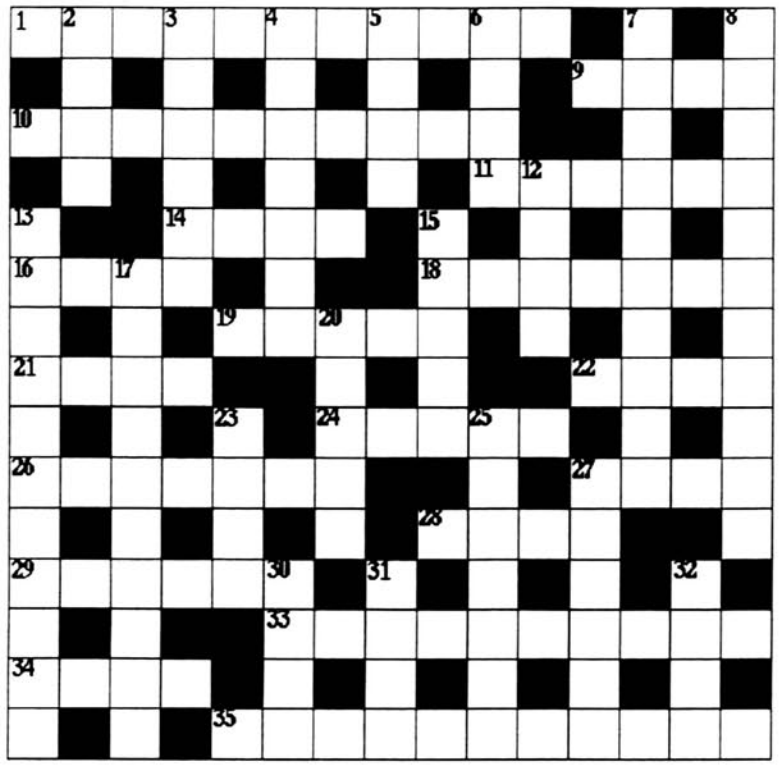
Solution to Crossword No 39

CROSSWORD

No 40 Quite on the Cards by Matt Varnish



Across

1. Duty card. (3,2,6)
9. Bathroom commodity for making old cards run smooth. (4)
10. Six of hearts in Kilkenny. (6,4)
11. Holst's counterpoint to circle Scottish name. (6)
14. To fix firmly one of five on hand. (4)
16. Old boy spoken early form the instrument. (4)
18. Players' night for non-playing man. (7)
19. Fashionable dog to bring on oneself. (5)
21. Revolutionaries cards (of two kinds). (4)
22. Short syllable game uses a 6th of the Spartans. (4)
24. Plays and in following wins easily. (5)
26. 56 with the fans make dyes. (7)
27. Game taken to task? (4)
28. New Zealand overseas experience makes the eleven game. (4)
29. Sets free wherein Pam is supreme before three points. (6)
33. See 20d.
34. Calls for contract. (4)
35. Admirably bad Hob of four hearts. (11)

Down

2. The fourth vehicle is in the pack. (4)
3. Of birds of augury or start of the cinema. (6)
4. A spell sounds coming up about South. (7)
5. The first of our time in the morning. (4)
6. Shaped by Shakespeare's divinity. (4)
7. Ace of diamonds for the lightweight peer. (4,2,4)
8. Casanova leads the suit. (3,2,6)
12. Dogcall on foot. (4)
13. The devil's bedposts. (4,2,5)
15. Idly play with holy spirit. (5)
17. See 20d.

20 and 33a. The same as 23d and 17d. (5,2,8), (4,2,8)

23. See 20d.
25. Bridge game not bridge. (7)
27. From Wales a maritime jurisprudence. (3,3)
30. Alone this whist for 4! (4)
31. Promise light surrounding spark of dialect. (4)
32. International party to take apart. (4)