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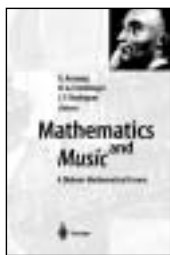
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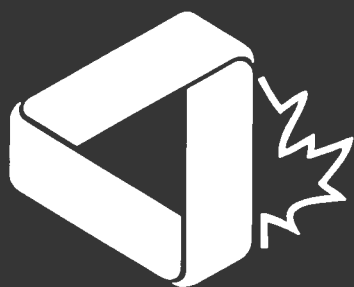
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NOTES

de la SMC

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EXECUTIVE DIRECTOR'S REPORT 2002



Graham P. Wright

A lot of help leads to success

The 2002 annual reports from the President, the Treasurer, and the 12 standing committee chairs demonstrate the extensive and increasing range of research, educational, and publishing activities which are administered and supported by the Society. Rather than repeat items dealt with in the other annual reports, I will focus on the scope of the administrative operations across the country and some highlights from 2002 and for 2003.

As Executive Director, I see first-hand the excellent service the Society receives, not only from the full-time and part-time staff at the Executive Office on the campus of the University of Ottawa, but also from the other staff at

the numerous editorial and other offices throughout Canada. In addition, the CMS benefits from a large number of volunteers who help on editorial boards, on committees, with our semi-annual meetings, and with our educational and other activities. The support from the many universities associated with our endeavors is a crucial component, permitting the Society to deliver a wide array of activities in a cost effective manner.

All of the Society's activities are coordinated by the Executive Office staff. The full-time staff at the Executive Office includes the Operations Manager (Monique Bouchard), the Web Services Manager (Alan Kelm), the Accountant (Diane Ellis), the Membership and Publications Agent (Liliane Sousa) and the Administrative Clerk (Suzanne Lalonde). Caroline Baskerville, who was the Assistant to the Executive Director for the past four years, left the position in June 2002. The position was filled on a temporary basis to the end of 2002 and I am pleased to report that, effective January 2003, Nathalie Blanchard will be the Assistant to the Executive Director. In addition to these six full-time positions, there are a number of part-time employees who help with the database, the web site and computer support.

The T_EX Office at the University of Manitoba, under the direction of Michael Doob, ensures that all issues of our two research journals (the

see SUCCESS page 24

CMS NOTES
NOTES DE LA SMC

Les *Notes de la SMC* sont publiés par la Société mathématique du Canada (SMC) huit fois l'an (février, mars, avril, mai, septembre, octobre, novembre et décembre).

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EDITORIAL



Robert J. MacG. Dawson

Never Just A Dream

A point traces a straight line against the sky. Suddenly the locus trembles, broadens, bifurcates, then divides again. Without being told, everybody watching knows that something is tragically, terribly, wrong

On February 1st, 2003, the space shuttle Columbia broke apart on re-entry; none of the crew members survived. The first and most immediate tragedy is, of course, the loss of seven lives. But we have all lost more, as well; it has been a setback in an enterprise in which the whole human race has had some indirect part. We in the scientific community have our own special reasons to pause and consider our loss. For mathematicians, this is not as obvious as it is to those who study some other branches of sciences; nonetheless, it is so.

Certainly, mathematics does not depend in a tangible way on space travel in the way that (for instance) astronomy does. The observations of satellite telescopes may confirm that the large-scale geometry of our universe is positively or negatively

curved, but the theories of spherical, Euclidean, and hyperbolic geometries exist regardless. Mathematics has something to say about crystals, but little about the practicalities of growing them in a weightless environment. The empty set is emptier than the hardest vacuum. We do not need to travel into space to find mathematics.

Indeed, we need very little, materially. Mathematics can be done in kitchens or in prison cells, on paper café tablecloths or margins of books. What is vital is the ability to imagine, to question, and to dream. Not transitory dreams, blown away in the breeze and forgotten, but dreams nurtured, disciplined, and brought to fruition, maybe over years; dreams that must be dreamed in a certain way, because there are right and wrong answers. This combination of rigor and imagination is, I think, fostered in the human race by the exploration of space. Perhaps it can bring our fellow human beings a little closer to a way of understanding that we know to be good.

Before the Apollo program, nobody could predict the technological spinoffs; and today we cannot predict what advantages space exploration may bring in the future. But this is an old tale to us, who watched number theory grow over centuries before finally—almost as an afterthought—it became the hemoglobin of electronic commerce. Who could have predicted the application of complex numbers to electronics, of category theory to the organization of databases, or of abstract algebra to theoretical physics?

When the human race attempts something glorious and just a little quixotic, like space exploration, more people learn something that mathematicians, among others, have always known. A dream, followed with patience and discipline, is never just a dream.

THE MATHEMATICS GENEALOGY PROJECT

Harry B. Coonce, North Dakota State University

The Mathematics Genealogy Project was conceived some six years ago as a project that would identify the relationships between research mathematicians and their dissertation advisors. Necessarily, this also identifies the relationship from advisor to advisees. We anticipate these records as a resource for helping us and future generations of scholars to trace the intellectual history of our subject.

The first web site was established in October 1977 with about 3500 records. Now in our sixth year we have records (some incomplete) on more than 61,000 mathematicians from about 840 schools in some 70 countries. We use the term “mathematics” in the broad sense to include statistics, operation research, mathematics education, and computer science.

The primary sources for our data are lists of records of degrees awarded obtained from the universities and information sent to us by individual mathematicians. Such records should include the full name of the degree recipient, the university from which the degree was obtained, year in which the degree was awarded and most importantly, the full name of the advisor. Thus, a complete record might appear as follows:

Coxeter, H. S. M. (Harold Scott MacDonald)
University of Cambridge
 1931
Baker, Henry

Recently, the project moved to its new home at North Dakota State University.

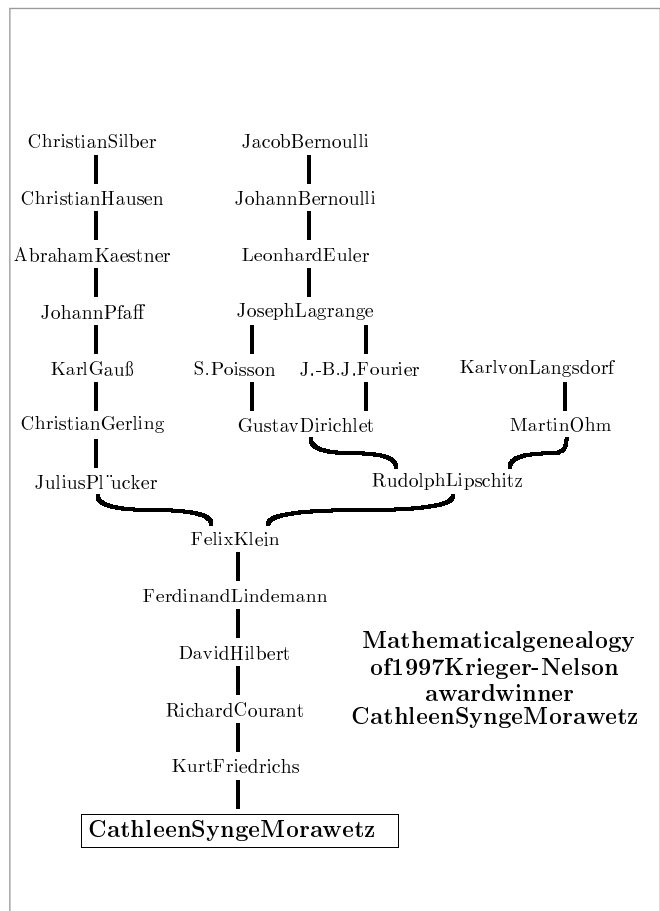
<http://genealogy.math.ndsu.nodak.edu>

For almost two years we have had a mirror in Germany at <http://genealogy.mathematik.uni-bielefeld.de>

In the coming months we expect to have mirrors in Canada, Brazil, and some other venues. Other enhancements planned for the near future include showing the Mathematics Subject Classification of the dissertation, switching to Unicode so that various letters not found in English are properly displayed, and making the general pages available in several languages.

For more information please visit the website or send email to harry.coonce@ndsu.nodak.edu. The website is set up to make it easy for you to trace your own “family tree”. This may go back quite a long way, until you reach either a gap in the record or a predecessor whose thesis was not supervised by a holder of a doctoral degree. (As this is unusual in recent times, if your search halts after only a generation two, a little research may restart it.) Multiple supervisors may add to the interest! The illustration accompanying this article shows an example of a genealogy with several illustrious branches, that of 1997 Krieger-Nelson award winner Cathleen Synge Morawetz.

You can order, for \$35 (US), a specially-printed T-shirt, showing somebody’s academic ancestry. (This could make an ideal graduation gift for a new Ph.D.!)



WHITTAKER AND WATSON'S *MODERN ANALYSIS*

By June Barrow-Green, The Open University, UK



E.T. Whittaker



G.N. Watson

This article first appeared in the September 2002 issue of the Newsletter of the European Mathematical Society and is reproduced here with permission.

One of the most enduring of English mathematics textbooks of the 20th century is Whittaker and Watson's textbook on the theory of functions of a complex variable, *Modern Analysis* or, to give it its full title *A course of Modern Analysis: an introduction to the general theory of infinite series and of analytic functions; with an account of the principal transcendental functions*.

But *Modern Analysis* did not start out as a joint enterprise, it began life in 1902 under the sole authorship of Edmund Taylor Whittaker (1873-1956), then a lecturer at the University of Cambridge. It was not until some years later that Whittaker joined forces with his former student (George) Neville Watson (1886-1965) and in 1915 a new revised and enlarged edition was published. The book has since been through two further editions, 1920 and 1927, and numerous reprintings, the latest as recently as 1996. For many years it was virtually the only book in English to give an introductory account of the methods and processes of analysis, and of the special functions used in mathematical physics. Indeed such was the paucity of books on the latter that at the time of Whittaker's death, more than 50 years after the first edition was published, the book's discussion of transcendental functions was considered to be "the only collective account in any language of the ground covered"¹. That is not to say that specialised accounts of some of the individual functions did not exist by that time—Watson's own treatise on *Bessel Functions* (1922) provides a good example—but there was nothing else by way of a general introduction to the subject.

The book originated, as so many textbooks do, out of a lecture course. In 1896 Whittaker, who had graduated Second Wrangler in the Mathematical Tripos the previous year, was elected to a fellowship of Trinity College Cambridge and upon his election he immediately began to lecture. Amongst the courses he gave was one on analysis, or complex function theory, and it was completely new. No-one before him had introduced anything like it into Tripos mathematics. Although AR Forsyth's *Theory of Functions* had been published in 1895, Forsyth lectured on it only to postgraduates and the reality was that the general theory of functions as developed by Cauchy, Weierstrass, etc. was barely known in Britain at the time. Indeed when Whittaker himself was an undergraduate such was the novelty of the subject that he used to hear Cambridge mathematicians speaking of "Cocky's" theorem!

Many distinguished mathematicians cut their teeth on Whittaker's course, and his students included such luminaries as GH Hardy and JE Littlewood, as well as AS Eddington, JH Jeans, HW Turnbull and GN Watson. According to Turnbull, Whittaker "began [the course on analysis], as always as far as I know, by introducing broad general ideas, here integration of rational functions, then connection with algebraic curves, with unicursal curves in particular, and leading steadily by pleasant advances to complex integration and the theory of residues. Then came differential equations..."². Since the students had no texts to consult, it was natural that Whittaker himself should fill the gap, and when *Modern Analysis* was published it became the textbook for the course and rapidly made a

¹ W.H. McCrea "Edmund Taylor Whittaker" *Journal of the London Mathematical Society* 32 (1957), 234-256, p.244.

² *op. cit.*, p.235.

name for itself. Much of the credit for getting the book to the publishers was due to Whittaker's wife. Not mathematically trained (and only very recently married!), she familiarised herself with the intricacies of mathematical symbolism in order to transcribe a fair copy for the press. And Whittaker's wife was not the only member of his family to get involved with the book. In the preface to the fourth edition ET Copson (1901-1980), Whittaker's son-in-law, was thanked for the trouble he had taken to supply the authors with a "somewhat lengthy" list of errors and misprints.

In 1906 Whittaker left Cambridge to take up the chair of astronomy in the University of Dublin, a post which carried with it the title of Royal Astronomer of Ireland. The move to astronomy was not as surprising as it might seem. Whittaker had a consuming interest in the development of mathematical physics, and while at Cambridge he had lectured on geometrical optics, electricity and magnetism, analytical dynamics, the three-body problem, and astronomy. Nevertheless, as he himself recognised, his own talents lay not in developing these subjects but in producing the sort of mathematics that was needed for their development. In 1912 he succeeded George Chrystal (1851-1911) as professor of mathematics at the University of Edinburgh and he retained the position until he retired in 1946.

Watson's career followed a not dissimilar trajectory to that of Whittaker. A scholar to Trinity, in 1907 he graduated as senior wrangler and in 1910 he became a Fellow of Trinity College. In 1914 he moved to University College London (UCL) where he remained until 1918. During the War he worked in Karl Pearson's computing laboratory at UCL, although it seems that Pearson did not find his manner altogether agreeable³. In 1918 he became professor of mathematics at Birmingham University, and he stayed at Birmingham until 1951 when he retired.

Thus the paths of Whittaker and Watson crossed at Cambridge for only a couple of years while Whittaker was a junior Fellow and Watson was an undergraduate. And although Whittaker's course must have made an impression upon him, it seems that, initially at least, Watson was more influenced by another lecturer with an interest in complex variable theory, EW Barnes (1874-1953). The topics of Watson's early research, finite difference equations, hypergeometric functions, asymptotic expansions, all formed part of Barnes' canon. Of Watson's early work, only his very first paper, "On the general solution of Laplace's

equation in n dimensions" (1906), had any direct connection with the research of Whittaker. Nevertheless, during the early years of the twentieth century Whittaker was responsible for much of the advance in complex function theory research so it is not surprising that Watson was drawn to him. The two became good friends and it was not long before Watson offered to share in the preparation of a second edition of Whittaker's book.

The second edition held the same shape as the original but it contained substantial additions. Watson was responsible for the inclusion of new chapters on Riemann integration, integral equations and the Riemann zeta function. For the third edition a further chapter on "Ellipsoidal Harmonics and Lamé's Equations" was added. Other additions and improvements to the second and subsequent editions include references to primary sources at the end of each chapter, an appendix on the elementary transcendental functions, a list of authors quoted, and a much improved index. The existing chapters were also largely rewritten. The new edition not only provided a more comprehensive survey of the subject—it was almost 50% longer than the original—but the treatment was altogether more rigorous and the style more formal. However, the fresh look was initially not to everyone's taste. It seems that some mathematicians, although by no means all, continued to prefer the original edition with its rather freer style and motivation towards more general results. Nevertheless, the new edition was popular and, in particular, the second part of the book, in which the authors defined the special functions by contour integrals rather than by differential equations, was found to be very useful. And it really came into its own in 1925 and 1926 when wave mechanics was being developed and solutions to the Schrödinger wave equation were being sought for various special problems.

One of the most prominent features of the book is its attention to the historical record. To find a route through the genesis and development of the subject, you have only to look at the footnotes and the list of references given at the end of each chapter. The references also provide a guide to the extent to which, in the second and later editions, the Whittaker's and Watson's own original research formed the basis for topics in the second half of the book. For example, the chapter on the *confluent hypergeometric function*, which first appeared in the second edition, grew out of a paper published by Whittaker in 1903 in which he had shown that this function was the general case of several

see MODERN ANALYSIS - page 16

³ On 20 February 1917 A.V. Hill wrote to K. Pearson, "I did not know that the War had not made him [Watson] more humble and human than he used to be, but from what you say it obviously has not. When one sees people here like Richmond and Bennett giving up their whole time with the utmost goodwill to what is often sheer drudgery and your people, and countless other people doing the same, one can only marvel at a man who thinks himself above such things." *Pearson Papers*, University College London.

A LOOK AT STOCHASTIC MODELS

Book review by Ed Perkins, UBC

Stochastic Models

D.A. Dawson, L.G. Gorostiza, B.G. Ivanoff (eds)

CMS Conference Proceedings, 26 American Mathematical Society, 2000 xxxvii + 450 pp

This volume is the proceedings of a conference held at Carleton University, in Ottawa in honour of Don Dawson, who retired from Carleton in 1999. The meeting was attended by a large number of Don Dawson's students, former postdoctoral fellows, collaborators and those interested in many of the fields in probability and mathematical statistics to which Don has contributed. The latter is a long list including stochastic models in population genetics, large deviations, stochastic partial differential equations (SPDE's), mathematical finance, queuing networks, mathematical statistics, Dirichlet forms, interacting particle systems and superprocesses. All of these fields are represented in the 27 articles in this volume.

The highlight of the meeting was Don Dawson's lecture which gave an overview of his research program over the past 25 years. Although the program included all of the subfields listed above, it centered on the use of infinite-dimensional stochastic processes to model large systems of interacting components. These systems could be large biological populations of individuals, evolutionary systems of genotypes, large collections of information units or customers in a large queueing network. Although all of these systems have their own particular models, from a methodological point of view they are surprisingly similar. One of the themes of this lecture, recounted as the first article in this volume, is the universality of a relatively small number of models arising as the space-time scaling limit of a much larger class of locally interacting models involving (near critical) random reproduction, migration, selection and competition. He touches on one of the most important aspects of this program—his work with Greven and others on the central role played by superprocesses and Fleming Viot processes as universal limiting objects in their multi-scale analysis of interacting systems. Recently the central role of super-Brownian motion as a universal limit of spatial stochastic processes near criticality has also been confirmed in a number of different and unexpected contexts including interacting particle systems, random trees and percolation. This work has been carried out by a number of researchers including Cox, Durrett, Hara, Van der Hofstad, Slade and myself. The article and lecture gives

a glimpse into how many of Don Dawson's research interests emerged from a common perspective and is rewarding reading for experts and non-experts alike. It ends with an interesting list of open problems. The first two on process characterization and universality are the aim of a number of ongoing research programs. The third on randomly evolving dynamical systems is just in its infancy. Perhaps we should pay attention, as Don has been ahead of most of us in the past.

Many of the papers in the volume are related to what are now called Dawson-Watanabe superprocesses (named so by E. Dynkin in 1988 to replace the less appealing "critical multiplicative measure-valued branching diffusion"). These are random evolving measures arising as the large population, large branching rate, small mass limit of the empirical measure of a system of particles undergoing independent random motion and critical branching. Starting with Jirina's paper in 1958 there were a number of works on "continuous" state branching processes including articles by Lamperti, Silverstein and Motoo. Jirina studied general continuous branching processes in which the Markovian migration mechanism is a finite state Markov chain, but the start of the modern theory of the field is usually given as 1968 when Shinzo Watanabe's seminal paper appeared. He constructed them, both analytically from their Laplace transforms and as limits of branching particle systems, and established the fundamental connection with a non-linear pde for a large class of branching mechanisms including the finite variance mechanisms described above. In 1975 Don Dawson published his fundamental paper in the area and independently rederived many of Watanabe's results (using characteristic functions rather than Laplace transforms) in the more general context of SPDE's. He discovered that, in general, solutions to the class of SPDE's he was studying did not seem to exist in spatial dimensions greater than 1, but for Jirina's continuous state branching with spatial diffusion, one could interpret the non-existent solutions to the corresponding SPDE as measure-valued processes. (This led naturally to his work with Ken Hochberg a few years later on the singular nature of these random measures in more than one dimension.) Don was lecturing on his work when Watanabe was in the audience. Apparently Watanabe came up after the lecture and politely pointed out that there might be some connections with some work of his own. Although Don may have been seven years behind Watanabe, he was at least ten years ahead of the rest of us. In the next few years he published a series of important

results giving the equilibrium behaviour of the processes, introducing a Girsanov transformation which allowed one to incorporate selection in the related genetics models, establishing the singularity of the measures in more than 1 dimension using the now standard cluster argument, introducing a dual particle system to study the Fleming-Viot model...All of these ideas are used (and sometimes cited) in many of the articles in this volume.

Although the nature of the volume means the range of topics in it is large, the editors have compiled an interesting collection of articles including a number which are first-rate original research contributions and others which are well-researched and enjoyable surveys. Moreover the fact that a majority of the articles deal with branching or coalescing stochastic systems give the volume a focus and natural audience.

Giving a description of the remaining 26 articles in the space available is clearly impossible, so I will risk offending most of the contributors by mentioning a few of the articles I read and enjoyed to give a feel for the volume. The article by Kurtz is an important improvement of his earlier work with Donnelly on lookdown processes (work whose origins can be traced back to an article of Dawson and Hochberg on the Fleming-Viot process). By changing the way in which particles are "marked" he is able to construct systems which project down to measure-valued diffusions with variable and state dependent branching rates, infinite variance branching superprocesses and Dynkin's exit systems. There is a nice and very readable survey by Klenke on catalytic branching processes. The article by Jeon and March deals with a problem related to coagulation and gelation in colloid physics. They give sharp conditions

under which the large clusters of a zero-range process will asymptotically absorb all the particles. Schmuland studies a class configuration-valued Markov process whose stationary laws are a Ruelle measure in statistical physics. He uses the associated Dirichlet forms to prove that some exceptional configurations are polar for this Markov process. Blount and Bose's article shows how Fourier methods are an effective tool in the study of superprocesses. There are more than a few articles here which the researcher in spatial branching processes would want to read. Perhaps the best way to appreciate Don Dawson's impact on probability and statistics in Canada is to note that 14 of the talks and 13 of the articles were contributed by his Ph.D. students, all of whom hold faculty appointments at Canadian universities and many of whom have become international leaders in their respective fields.

CALL FOR NOMINATION / APPEL DE CANDIDATURE

Distinguished Service Award / Prix de service méritoire

In 1995, the Society established this award to recognize individuals who have made sustained and significant contributions to the Canadian mathematical community and, in particular, to the Canadian Mathematical Society.

The first awards were presented at the 1995 Winter Meeting in Vancouver to Donald Coxeter, Nathan Mendelsohn, John Coleman, Maurice L'Abbé and George Duff. Awards were presented at the 1996 Winter Meeting in London, Ontario to David Borwein and P.G. (Tim) Rooney, at the 1999 Summer Meeting in St. John's, Newfoundland to Michael Doob and S. Swaminathan, and at the 2000 the Winter Meeting in Vancouver, British Columbia to Arthur Sherk. The 2001 award was presented to James Timourian at the Winter Meeting in Toronto and the 2002 award to Peter Lancaster at the Winter Meeting in Ottawa.

Nominations should include a reasonably detailed rationale and be submitted by **March 31, 2003**, to the address below.

En 1995, la Société mathématique du Canada a créé un nouveau prix pour récompenser les personnes qui contribuent de façon importante et soutenue à la communauté mathématique canadienne et, notamment, à la SMC.

Les premiers lauréats, Donald Coxeter, Nathan Mendelsohn, John Coleman, Maurice L'Abbé et George Duff, furent honorés lors de la réunion d'hiver 1995 à Vancouver. Les lauréats, David Borwein et P.G. (Tim) Rooney, furent honorés lors de la réunion d'hiver 1996 à London, Ontario. Les lauréats, Michael Doob et S. Swaminathan, furent honorés lors de la réunion d'été 1999 à St. John's, Terre-Neuve. Quant aux lauréats 2000-2002, Arthur Sherk fut honoré à la réunion d'hiver 2000 à Vancouver, James Timourian à la réunion d'hiver 2001 à Toronto et Peter Lancaster à la réunion d'hiver 2002 à Ottawa.

Pour les mises en candidature prière de présenter des dossiers suffisamment détaillés et de les faire parvenir, le **31 mars 2003** au plus tard, à l'adresse ci-dessous.

Selection Committee / Comité de sélection

Distinguished Service Award / Prix pour service méritoire
Canadian Mathematical Society / Société mathématique du Canada
577 King Edward, Suite 109, P.O. Box 450, Station A / C.P. 450, Succ. A
Ottawa, Ontario K1N 6N5

BRIEF BOOK REVIEWS

S. Swaminathan, Dalhousie University

Solve This: Math Activities for Students and Clubs

by James Tanton

Mathematical Association of America, 2001 xiv + 218 pp.

This book is a collection of intriguing mathematical problems and activities linked by common themes that involve working with objects from everyday experience. It shows how mathematics is accessible to one and all. For example, the reader is led to investigation and discovery while learning about the mathematical mysteries of a bagel, a checker-board, a pile of laundry, weird wheels and braids. The necessary mathematics, in increasing levels of sophistication, is explained along the way. Mathematics educators may find fresh and innovative approaches to some topics for classroom use.

Mathematical Evolutions

Edited by Abe Shenitzer and John Sitwell

Mathematical Association of America, 2002 xii + 302 pp.

From January 1994 the American Mathematical Monthly published a column of expository articles entitled "The Evolution of", the purpose of which was to shed light on the meaning and significance of important mathematical ideas. The present book is a collection of these essays. The articles cover a large number of topics in analysis, algebra, geometry, probability, and logic, and are grouped by subject matter. The topics deal with ideas that are "classical", i.e., of established weight and importance, with special attention paid to those that overlap different domains of mathematics or disciplines such as physics and philosophy. The contributors include some of the finest mathematicians of the 20th century such as Atiyah, Doob, Luzin, Magnus, Tits and H. Weyl.

Isomonodromic Deformations and Applications in Physics

Edited by John Harnad and Alexander Its

CRM Proceedings and Lecture Notes, Volume 31 American Mathematical Society, 2002 xv + 218 pp.

This volume consists of contributions based on lectures given by the authors at a workshop that took place at the CRM, May 2000. The first part, which contains seven articles, is devoted mostly to the mathematical aspects of isomonodromic deformations and the second part, which contains eight articles, is devoted to "applications to physics and related topics" dealing mostly with the various appearances of isomonodromic deformation and Riemann-Hilbert methods in the theory of exact solvable quantum field theory and statistical mechanical models, and related issues. An expository article by A. Bolibruch gives an introduction to

isomonodromic deformations while discussing some inverse problems of the analytic theory of linear differential equations with meromorphic coefficients. An expository paper of C. Tracy and H. Widom explains the appearance of the first nontrivial cases of isomonodromic deformation equations, i.e., Painlevé's equations in the theory of random matrices.

Mathematical Treks: From Surreal Numbers to Magic Circles

by Ivars Peterson *Mathematical Association of America, 2001 xii + 180 pp.*

This is the first book in a joint publishing venture between the MAA and Science News. The chapters in this book are updated versions of Ivars Peterson's columns entitled Science News Online (<http://www.sciencenews.org>) which appeared in 1996 and 1997. The articles provide fascinating glimpses of mathematics in action, from exciting developments at the leading edge of research to new perspectives on venerable puzzles, famous problems, and historic events. Consider, for example, the triangle of three bent arrows that signifies recycling, which appears in newspapers, on bottles, cartons, etc. A watchful eye would notice that there are two versions of this ubiquitous symbol. In the chapter entitled Recycling Topology the author discusses the representation of these versions as continuous folded ribbons, showing that one version is a Möbius band made with one half-twist, and the alternative has three half-twists. In a series of well-written articles the author presents surreal numbers, chess-playing computers, magic squares, mathematical humor, pi mania, and much more.

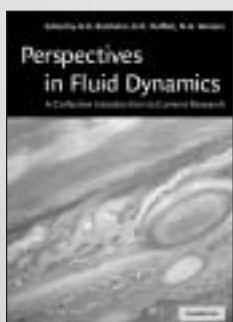
Ordinary Differential Equations: A Brief Eclectic Tour

by David Sánchez

Mathematical Association of America, 2002 xii + 132 pp.

The authors says in his Preface that this is not a textbook, but is instead a collection of approaches and ideas worth considering to gain further insight, of examples or results which bring out or amplify an important topic, or behavior, and an occasional suggested problem. It can be used as a resource guide for teaching an undergraduate course, or as a supplementary text for deeper understanding of the subject. With very little mathematical modeling included, the book is more conceptual than definitive, and more lighthearted than pedagogic. The order of topics covered is the standard one. A few novel items are included such as existence of periodic solutions of first-order equations, general conditions for the onset of resonance, and harvesting to two-population models. Finally Gronwall's Lemma leads to a proof of the Poincaré-Perron Theorem, the foundation of the analysis of almost linear systems.

OUTSTANDING NEW MATHEMATICS BOOKS

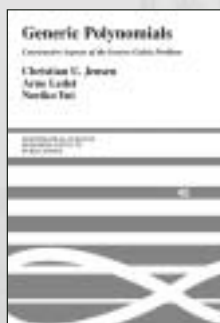


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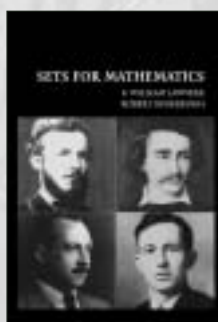
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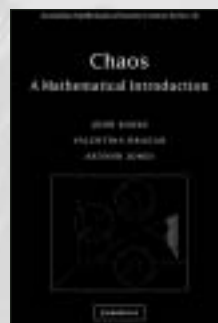
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CANADA RESEARCH CHAIRS IN THE MATHEMATICAL SCIENCES

The Editors regret that the CMS Notes has not quite kept up with the creation of Canada Research Chairs in the mathematical sciences! Starting in this issue, we will attempt to remedy this situation, beginning with three that were inadvertently overlooked in our last list, and two created last fall.

The following are reprinted from www.chairs.cg.ca

Edwin A. Perkins

Canada Research Chair in Probability
The University of British Columbia
Tier 1 – July 1, 2001

Scientific research in probability theory—establishing models to determine the likely number of times a certain event may occur—is highly valued in Canada because it plays such an important role in so many diverse areas. It is particularly important in such fields as physics, statistics, computer science, information technology, genomics and ecology, which rely on models of randomness based on mathematical formulas.

Dr. Edwin Perkins is a leading researcher in probability theory. His outstanding contributions have been applied to several research fields. In fact, over the past twenty years, Dr. Perkins' work has settled wide-ranging and previously unresolved issues, opened up new avenues of research, and attracted worldwide interest among leading probability specialists.

As Chair in Probability, Dr. Edwin Perkins has built an expert team of top university researchers to continue his work in this challenging field. This group is reputed to be the strongest in probability in Canada, and one of the most influential in the world. All four members are Fellows of the Royal Society of Canada. Additionally, Dr. Perkins is the 2001 winner of the Jeffrey-Williams prize, the most prestigious award of the Canadian Mathematical Society.

Dr. Perkins' team is studying interacting particle systems arising from stochastic (random) models of populations including competing species, as well as predator-prey and symbiotic systems that experience random reproduction, migration and selection. This fundamental research aims to establish theories for stochastic mathematical models, which in turn should enable more precise predictions of mathematical probabilities. To achieve these results, the team is collaborating with visiting scientists from the U.S.,

France, Israel, Holland and Canada, postdoctoral fellows and graduate students.

Pondering fundamental scientific questions is important to all modern societies. By gaining a deeper mathematical understanding of certain simplified models of interacting species, Dr. Perkins' research may eventually improve our knowledge of more complex models, and provide valuable predictability tools for application in other mathematical fields.

Christophe Reutenauer

Canada Research Chair in Combinatorial Algebra and Mathematical Computing
Université du Québec à Montréal
Tier 1 – June 1, 2001

Since the brilliant discoveries of mathematician and physicist Sir Isaac Newton, who revealed the mathematical aspects of the movement of celestial bodies, we have known that mathematics are essential to progress in all the sciences. It is even said that the laws of nature are written in the language of mathematics. Combinatorics is a branch of mathematics that grew considerably over the 20th century. It is closely linked to modern algebra, theoretical physics and particularly to theoretical informatics. The main goal of this research chair is to enable Canada to bring one of the greatest combinatorics experts in the world back to the country.

Dr. Christophe Reutenauer is a former student of the École Normale Supérieure in Paris and is currently a researcher at Université Louis-Pasteur in Strasbourg. He works closely with researchers at the Université du Québec à Montréal, where he was a professor during the 1980s and 1990s; the chair will enable him to return to the university. For the past twenty years, he has been considered to be one of the most original researchers of his generation; he has been a visiting professor at several European and North American universities and is now a leader in his field. Many of Dr. Reutenauer's publications are now considered to be classic works. His work has been recognized not only for its content, but also for its educational value, and he has done much to advance the understanding of mathematics.

His research in applied mathematics could have significant impacts on vital areas of application, including algorithmics, cryptography, telecommunications, statistical mechanics, combinatorial chemistry, bioinformatics and genomics.

David J. Thomson

Canada Research Chair in Statistics and Signal Processing
Queen's University at Kingston
Tier 1 – January 1, 2002

How does solar radiation interfere with cellular telephone communications? What can we discover about solar activities that might help to address challenges such as global warming? Are there effective ways to harness our forests and farmlands to better control climate change and contribute to a dynamic and sustainable rural economy? As Chair in Statistics and Signal Processing, Dr. David Thomson is seeking answers to many such questions.

Dr. Thomson is a leading mathematical engineer who has contributed much to research involving: statistical and time series analysis (e.g., a series of daily average temperatures collected from one location); communications systems; the climate; and space physics/solar oscillations. One of his more notable contributions was the development of the multi-taper method, an innovative mathematical technique for estimating the power spectrum and related functions. Many scientists believe this tool is essential to time series analysis and climate research. Dr. Thomson used this technique to offer the first undeniable proof that Earth is heating up.

Dr. Thomson and his team are now furthering his multidisciplinary research. Their key focus is to analyze time series data and develop mathematical strategies to tackle a number of problems from such diverse areas as astronomy, seismology, space and solar activity, and climate. This requires strong collaborations with researchers in the Departments of Mathematics and Statistics, Electrical and Computer Engineering, Physics, and Biology, and with scientists at prestigious institutions around the globe.

One major objective is to characterize how climate and solar radiation affect wireless communications systems. Dr. Thomson's most recent work has focused on climate, space physics data, and problems related to dropped calls in cellular systems, so he is well suited to the task. His first priority is to partner with members of the Astrophysics group to build a two-metre radio telescope. This cutting edge instrument will monitor solar activity and provide valuable insight into interactions between the sun and communications networks.

Troy Day

Canada Research Chair in Mathematical Biology
Queen's University at Kingston
Tier 2 – October 1, 2002

Society is currently making discoveries at an unprecedented rate about the workings of the biological world, right down to the molecular level. A major challenge with this deluge of information is to develop a robust conceptual

framework to explain how the attributes of these biological systems have evolved.

Dr. Troy Day is a mathematical biologist who specializes in evolutionary ecology. Effective research in mathematical biology, which is interdisciplinary in nature, requires a strong knowledge of biology coupled with strong quantitative skills and a thorough knowledge of applied mathematics. Dr. Day's background in biology and mathematics make him uniquely qualified for such research.

As Canada Research Chair, Dr. Day will develop mathematical models of evolution that abstract a small number of biological factors thought to be crucially important. These models will then be analyzed using a combination of analytical, numerical, and computational techniques to explore their behaviour and to generate novel predictions about how we expect biological systems to evolve.

The research will address three broad areas of evolutionary biology: evolutionary medicine (the evolution of pathogen virulence and the evolution of senescence); genomic and sexual conflict/sexual selection; and the effect of spatial population structure on evolution. This research will be carried out using a combination of applied mathematics, computationally intensive individual-based computer simulations, and the extremely powerful software "Mathematica."

Dr. Day will approach these questions primarily with an interest in basic science, but his research has the potential to make contributions to the applied issues such as: understanding why some parasites have evolved to induce extremely high host mortality whereas others induce very little mortality or understanding how and why certain patterns of aging have evolved.

John Jardine

Canada Research Chair in Applied Homotopy Theory
The University of Western Ontario
Tier 1 – October 1, 2002

Combinatorial homotopy theory—the algebra of fitting spaces together—has been a driving force in mathematics since its inception in the 1890s. This theory has generally been applied to geometry and number theory, but researchers are now investigating its application to a number of other disciplines, such as computer science and physics. Such applications, and the multi-disciplinary interest they are generating, have given rise to new and exciting research opportunities. For instance, researchers have applied homotopy theory to analyze gravity at small distance scales; to determine how massively parallel computers behave; and to study the flow of information in large social networks.

Dr. John F. Jardine is an exceptionally gifted mathematician whose ideas continually contribute to many fields. He heads the University of Western Ontario's Applied

Homotopy Theory Group, a highly skilled team that is unique in Canada and one of few groups in the world dedicated to this emerging field. Under his leadership, the group has gained international recognition for their pioneering discoveries.

As Chair in Applied Homotopy Theory, Dr. Jardine will guide and advance theoretical and computational research in three specific areas, cubical homotopy theory, higher order stacks and motivic chain complexes. The objective of this work, in part, will be to develop novel applications for parallel processing architectures, network connectivity, sequential dynamical systems, quantum gravity, calcu-

lational knot theory, computational algebra of hyperplane arrangements and combinatorial algorithm testing. Over time, the group will turn its attention to analyzing the local behaviour of decision structures in sequential dynamical systems, to extracting approximate geometric structure from large data sets, and to other research projects.

To achieve optimum results, Dr. Jardine and his team will build a state-of-the-art computing laboratory housing a network of flexible, high speed (gigabit) computer equipment. They will also collaborate with top researchers and computational scientists at the university and in major centres elsewhere who are focused on similar research.

DEPARTMENT OF MATHEMATICS – SIMON FRASER UNIVERSITY

Burnaby, British Columbia – Lecturer in mathematics

The Department of Mathematics has entry-level positions for two full-time lecturers to support its instructional program starting September 2003. Duties include teaching eight courses per year (most of them with large classes), or the equivalent from among the following activities: teaching, undergraduate advising, graduation certification, coordinating departmental workshops, assisting in curriculum development and the introduction of technology, high school liaison, and student recruitment. The successful candidate will be expected to be actively involved in the life of the department, including service on committees. Applicants should have at least a master's degree in mathematics or applied mathematics, have their primary interest in teaching mathematics at the undergraduate level, and have demonstrated excellence in teaching. They must also have knowledge of current technology and its use in teaching mathematics.

Starting salary is in the range \$48,793 to \$55,763 per annum (plus benefits), depending on experience and qualifications. Simon Fraser provides one paid semester free of teaching duties every nine semesters for the lecturer's professional development. In addition, lecturers are eligible for study leave after six years of successful employment, see

<http://www.sfu.ca/policies/academic/a31-06.htm>

Applicants should submit a curriculum vitae, teaching dossier, and the names of three individuals familiar with their teaching abilities to:

Lecturer Search: mathlecturer-search@math.sfu.ca

Department of Mathematics
Simon Fraser University
8888 University Drive
Burnaby, B.C. V5A 1S6

Only short-listed candidates will be notified of the outcome of their application.

Closing date: April 15, 2003

SFU is committed to an equity employment program that includes special measures to achieve diversity among its faculty and staff. We therefore particularly encourage applications from qualified women, aboriginal Canadians, persons with disabilities, and members of visible minorities.

All qualified candidates are encouraged to apply; however, Canadians and Permanent Residents will be given priority.

EDUCATION NOTES

Ed Barbeau and Harry White

Canada Wide Science Fair

Once again, in May, 2002, the Society presented awards at the Canada Wide Science Fair to intermediate and secondary students whose displays had a significant mathematical component. The event was held in Saskatoon, SK, and the judging on behalf of the Society was undertaken by several colleagues at the University of Saskatchewan: James Brooke, Bjorn Friberg, Franz-Viktor Kuhlman, Salma Kuhlman, John Stephenson and Keith Taylor.

The senior award went to **Andrea Dukeshire** of Calgary, AB whose project *Stability of Tops* looked at the measurement of “critical speeds of stability on different surfaces, and analyzed these quantitatively and qualitatively through calculation and graphical means by means of Eulerian, Lagrangian and Hamiltonian methods.”

The intermediate award was given to **Eugene Savchenko** of Ottawa, ON whose project *3D Scanner* was “an automated system for remote, non-contact recreation of 3-dimensional computer models of real objects”. The competitor “designed original software that allows processing 2-dimensional images from a web-camera into an accurate 3-dimensional computer model and viewing it from different angles”.

The recipient of the junior award was **Anthony Chiarelli**, a Grade 7 student at St. Teresa of Avila School in Hamilton, ON. His project was on *Steganography*, the art of concealing data. His “objective was to create a computer program that would encode text messages into digital images so they would be unnoticeable. Two methods were developed with the second method successfully fulfilling the stated objective.”



Senior Award winner
Andrea Dukeshire of Calgary, AB

New educational research in Québec

Many PhD students who have recently (within the past 10 years) finished their theses don't publish their research for all kind of reasons. A group of university teachers of Quebec have decided to publish (in a pocketbook format) such theses related to mathematics education as represent valuable work and are of great interest for activities in classrooms.

For more information, visit the website

Bande.Didactique@internet.uqam.ca .

Here are abstracts of some of these works.

Titre: *Fait-on ce qu'on pense quand on enseigne les mathématiques?*

Auteure: *Linda Gattuso*

Résumé. L'originalité principale de cette thèse tient surtout au fait que la chercheuse et le sujet étaient une seule personne. Cette observation autoanalytique a entre autres permis de montrer comment des problèmes du quotidien peuvent parfois contrecarrer les volontés de l'enseignant.

Titre: *Résoudre par X et Y ou par 1, 2, 3: telle est la question.*

Auteure: *Sylvine Schmidt*

Résumé. Des futurs enseignants de différents programmes de formation en enseignement se posent cette question. L'auteure met en évidence les difficultés rencontrées dans le passage d'un mode de raisonnement arithmétique à un mode de raisonnement algébrique, puis dans le retour au raisonnement arithmétique lorsque le raisonnement algébrique est installé. Quatre sources de difficultés sont identifiées: le statut accordé au symbolisme, le rapport au savoir entretenu dans ces deux domaines, l'écart existant entre les deux formes de raisonnements et la nature du contrôle exercé en arithmétique et en algèbre.

Titre: *4 dizaines et 10 unités font 410, pourquoi?*

Auteure: *Lucie DeBlois*

Résumé. Le but de cette recherche était d'observer le développement de la compréhension de la numération positionnelle chez six enfants de 8 à 11 ans. Conçus d'abord comme la juxtaposition des chiffres correspondant aux groupes et aux éléments, les grands nombres ont ensuite été vus comme le résultat d'un comptage et enfin comme le résultat d'une opération entre différentes unités de mesure de quantité.

Titre: *Dessine-moi un bateau: la multiplication par un et demi .*

Auteur: *Pascale Blouin*

Résumé. Le point de départ de cette recherche était la planification d'un enseignement sur les nombres rationnels pour des élèves en difficultés d'apprentissage au début du secondaire. Les travaux de recherche de Kieren (1988) et Brousseau (1981) ont inspiré l'élaboration et l'expérimentation des situations. Les résultats présentés dans cet ouvrage permettent de mener une réflexion sur la manière de penser l'enseignement de ce savoir en considérant l'importance de l'histoire scolaire des élèves. La lecture de cet ouvrage incitera peut-être des personnes à persévérer dans la réalisation d'expérimentations didactiques à des fins de recherche.

Harry White (Harry_White@uqtr.quebec.ca)

Sleepless in Ontario

It would be an understatement to say that the last few years have been hectic ones for Ontario education, as the province is implementing a new 4-year secondary curriculum (OSS) to replace the old 5-year curriculum (OSIS). Not only has it been necessary to reorganize the topics to fit the new schedule, but the new curriculum is informed by a change of philosophy that puts a lot of emphasis on exploration, use of technology, understanding and communication, with concomitant changes in evaluation. The Fields Institute has a subcommittee chaired by Ed Barbeau and Stewart Craven, the mathematics coordinator for the Toronto District School Board, to bring together individuals from the secondary and tertiary levels and in particular to encourage meetings between the two sectors in various centres in the province.

In particular, I would like to report on meetings held on November 7, 2002 in Toronto at the Fields Institute between secondary teachers and faculty members of the three Toronto universities, and on November 14, 2002 in Ottawa at Carleton University between secondary teachers and faculty members of the two Ottawa Universities, the latter organized by Shawn Godin of the Ottawa-Carleton District School Board. The purpose was to exchange views on how well students will manage the transition from secondary to tertiary education. Of particular interest are the three Grade 12 courses for university-bound students, namely

- AFIC: MCB4U Advanced functions and introductory calculus
- GDM: MGA4U Geometry and discrete mathematics
- MDM: MDM4U Mathematics of data management

Information can be had from the following websites:

- <http://www.curriculum.org/occ/occindex.htm>
- http://www2.tvo.org/edulinks/subject_math.html
- <http://www.edu.gov.on.ca/eng/document/curricul/secondary/grade1112/math/math.html>

The current academic year is the first one in which the OSS syllabus is being taught in Grade 12, as well as the last one for the OSIS syllabus. So there are two cohorts of students graduating from the secondary system, and the enrolment in the two programs seems to be roughly evenly split. However, students in the new program are finding it quite difficult and teachers seemed to be pressed to find the time for fostering the sort of inquiry called for in the documents. GDM, where formal proof is presented for the first time, has suffered quite a high attrition rate. (The OSIS curriculum involved excursions into geometric proofs from grade 9 on.) At this point, it is not clear how successful MDM will be in finding its appropriate audience, as it is experimental in putting a lot of emphasis on the completion by the students of a major project and is quite different from the OSIS courses. AFIC seems to be picking up a broad range of students, many of whom are finding it tougher than expected. The students on the whole are very hardworking and keenly feel the pressure they are under in being involved in a new program and competing with graduating students from the old regime; unlike with OSIS, repeated courses taken by the OSS students will be recorded on their transcripts so they need to do well the first time. Many teachers, while enthusiastic about the new approach, are still not comfortable with the pacing and have not had a chance to address the new philosophy of grading that puts less emphasis on tests and examinations and more on other strands of performance than technical skills. The use of technology seems not to be fully embraced everywhere so that the experiences of the students will vary.

Teachers warn that the OSS students will be one year less mature and will have weaker skills. However, they will have used, to quote the Ottawa minutes, a variety of skills in learning and doing mathematics, have used graphing calculators, computer software and manipulatives more than OSIS students. As a result, they may have stronger problem solving skills. It was noted by teachers of both cohorts that OSS students' ability to sketch curves was better than that of OSIS students. OSS students, unlike their OSIS counterparts, do not have any trigonometry in the calculus course, so they have not seen it since an introduction to the topic in Grades 10 and 11; the OSS students will have a weaker background in complex numbers. However, the graduates of MDM should have a stronger grip on statistical ideas.

Many universities have not implemented significant changes in their first year offerings because the possible scope and effects of the changes are not clear. Carleton

University has modified its first year courses in response to the mixed background of its students next year. There will be more emphasis on trigonometric functions, while an introduction to differential equations will now be deferred to second year. In linear algebra, complex numbers will be fully developed while discussion of inner products and orthogonality will be postponed until second year. Since the prerequisite for the first statistics course will be any one of the three OSS courses, those who have taken MDM may be at an advantage in handling this “data-driven” course. An appendix to the Ottawa minutes was a review by Dr. Matthias Neufang on one of the AFIC texts. His overall impression was “very positive” with respect to the structuring of material, presentation of exercises and treatment of topics.

The Ontario Association of Mathematics Educators, the Fields Institute and various faculties of education have been heavily involved in providing professional development, and the prospects for mathematics education in Ontario look quite promising in many respects. However, the securing of solid and strategic technical skills and the ensuring of a sufficiently rich experience for those students able enough to go into high level mathematics, engineering and science programs are issues that will require constant vigilance.

Algebra for the young

There seems to be a push to introduce formal algebra at earlier and earlier stages in the elementary curriculum. Some of the recent textbooks that I have seen introduce variables gratuitously, so that instead of asking for a simple subtraction $8 - 5$, pupils are asked to solve the equation $n + 5 = 8$; in other questions, they are asked to make substitutions in decontextualized algebraic equations. It is hard to see what sense or purpose an elementary pupil finds in this sort of thing. It seems more productive before high school to introduce algebraic notation only into situations where it arises naturally. Some of the traditional ways are through formulae, such as that for the area of a rectangle. In some situations, the use of algebraic expressions is a useful way to encapsulate information. While it is easy to express verbally the relationship between feet and yards (three feet equal one yard) and use this without any algebraic mediation, it seems more convenient to express the relationship between the Celsius and Fahrenheit temperature scales by means of an equation $F = (9/5)C + 32$. In a similar way, it may be useful to express a numerical pattern algebraically: $3^2 + 4^2 = 5^2$ and $5^2 + 12^2 = 13^2$ are instances of $(2n+1)^2 + (2n(n+1))^2 = (2n(n+1)+1)^2$. But all such introductions should be done pragmatically with a sensitivity to what the class can comprehend and with a view to providing an experience of legitimate uses of algebraic notation and conventions that can be built upon for a formal introduction.

An interesting situation that involves some algebra with other ingredients that are desirable in a modern curriculum is that of certain polyhedra. It is popular to tell pupils about the Euler relationship for convex polyhedra: $V - E + F = 2$, where V , E and F are respectively the numbers of vertices, edges and faces of the polyhedron. This can actually be motivated by the use of tables and established for pyramids and prisms whose bases are polygons of n sides. A nice proof for a general polyhedron is found in the book, *The enjoyment of mathematics*, by Hans Rademacher and Otto Toeplitz; some pupils in the middle school might be able to follow a careful presentation of this by the teacher.

The preparation has now been laid for the following set of exercises about polyhedra:

- (1) Explain why the average number of edges per face is $2E/F$.
- (2) Explain why at least three edges must meet at each vertex, and deduce from this that $3V \leq 2E$.
- (3) Use (2) and Euler's equation to argue that $6 \leq 3F - E$ so that $E \leq 3F - 6$.
- (4) Why must any convex polyhedron have at least one face with fewer than six edges?

The follow questions will deal with the special case that the polyhedron has only faces that are pentagons or hexagons. Let there be A pentagonal and B hexagonal faces. Examples are the regular dodecahedron and the configuration of a soccer ball. Pupils might be asked to verify the Euler equation in both of these cases.

- (5) Explain why $F = A + B$ and $2E = 5A + 6B$.
- (6) Verify that $12 = (6F - 2E) - 2(2E - 3V)$.
- (7) Deduce from the preceding results that any convex polyhedron all of whose faces are either pentagons or hexagons must have at least twelve pentagonal faces. Suppose that such a solid has exactly twelve pentagonal faces; what can be said about the number of edges meeting at a vertex? Make some models of such polyhedra.

While such an evolution of mathematics is hardly appropriate for the general run of pupils in the Grade 7-9 range, I am willing to bet that, carefully handled, it can be successfully pursued with a much larger subset of these pupils than many educators might pretend. The main difficulty is probably getting used to the refined and precise use of mathematical language and the degree of abstraction that calls for the use of algebraic notation. Technically, all that is required is a modest ability to manipulate linear expressions. However, it is hard to interpret the algebraic expressions, in terms of their derivation and the conclusions that can be drawn from them. This might be helped by having pupils check them out on various polyhedra available in class. But think of the considerable

benefits following from this unit. There is a significant amount of geometry; inequalities (a difficult topic for many students) are introduced in a natural setting; there is a fair bit of interpretation and reasoning; at the end of it all, there are a couple of interesting results. In fact, the knowledge that any convex polyhedron has at least one face with three, four or five vertices allows for a quick argument by induction that the faces can be coloured with at most six colours so that no adjacent faces be coloured the same. A little more trouble is needed for the five-colour theorem. The proof of the four-colour theorem is a much more

complex working out of the same strategy of finding a set of configurations at least one of which is part of any possible map.

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Hans Rademacher & Otto Toeplitz, "The enjoyment of mathematics" Princeton, 1957. (*Essay 12: The four-color problem*, pp. 73-82)

MODERN ANALYSIS (continued from page 5)

other special functions previously introduced by various authors⁴. (That the London Mathematical Society rejected the paper, later considered to be "the most fruitful generalisation of the theory of special functions of the past century"⁵, so that it was published in America, gives an indication of the general state of knowledge on the subject in Britain at the time.) The same chapter also contains a discussion of the *parabolic cylinder functions*, a topic that Whittaker also first addressed in a paper of 1903⁶, and one that Watson considered in papers of 1910 and 1919⁷. The subject of another chapter, *Mathieu functions*, was originally dealt with by Whittaker in a paper presented at the International Congress of Mathematicians in Cambridge in 1912, on which occasion he took the opportunity to name the functions in honour of their discoverer⁸. And, of course, Watson's work on Bessel functions, which culminated in his eponymous treatise on the subject, informed the chapter of the same name in the book.

During the 1950s Watson felt that much of the book had become outdated, and in his retirement he set to work on an extensive revision of the entire text. But the project was never finished. By the time of his death he had mapped out the contents of fifteen chapters. After the introduction, the next few chapters developed number systems from the rational numbers through complex numbers and quater-

nions. The remaining chapters cover a diversity of topics such as interpolation, Jordan's and Cauchy's theorems, inequalities, cyclotomy etc. The manuscript, which is in the archives at Birmingham University, is too sketchy to publish, but it is notable for the completeness of the historical footnotes, which reveal the extraordinary depth of Watson's knowledge of his mathematical heritage. It appears that Watson had planned to rewrite the entire book himself, with the exception of a chapter on automorphic functions which he had marked out for Whittaker to write.

Given their shared interests and the nature of their joint enterprise, one might have expected Watson to have made several trips to Scotland to visit Whittaker. But in fact he only made two trips north of the border, once in July 1914 to attend the Napier tercentenary Congress and once in June 1939 to receive his honorary LL.D from Edinburgh University. Apparently Watson used to say that he feared making a third visit as "each of his two previous visits had precipitated a major European catastrophe"⁹.

Today, *Modern Analysis* is more useful as a book of reference rather than as a course text. However, as the author of this article will testify, anyone who requires an introduction to the topics it contains or who has an interest in the history of the development of analysis will find it an invaluable repository of information.

⁴ E.T. Whittaker "An expression of certain known functions as generalised hypergeometric functions" *Bulletin of the American Mathematical Society* 10 (1903), 125-134.

⁵ J.M. Whittaker "George Neville Watson" *Biographical Memoirs of Fellows of the Royal Society* 12 (1967) pp.521-530.

⁶ E.T. Whittaker "On the functions associated with the parabolic cylinder in harmonic analysis" *Proceedings of the London Mathematical Society* 35 (1903), 417-427.

⁷ G.N. Watson "The harmonic functions associated with the parabolic cylinder" *Proceedings of the London Mathematical Society* 8 (1910), 393-421; 17 (1919), 116-148.

⁸ E.T. Whittaker "On the functions associated with the elliptic cylinder in harmonic analysis" *Proceedings of the 5th International Congress of Mathematicians I* (1912), 366-371.

⁹ R.A. Rankin "George Neville Watson" *Journal of the London Mathematical Society* 41 (1966), 551-565.

SOCIÉTÉ MATHÉMATIQUE DE FRANCE

par Michel Waldschmidt

Les mathématiques ne connaissent pas les frontières: depuis longtemps les mathématiciens coopèrent avec leurs collègues étrangers, ignorant les distances qui les séparent. C'est encore plus facile quand ils utilisent la même langue, et c'est un des éléments qui favorisent les relations entre les mathématiciens canadiens et leurs homologues français. Il était donc naturel que nous resserrions ces liens en nous rencontrant, et c'est ainsi qu'est née l'idée du colloque conjoint entre nos sociétés, qui se tiendra à Toulouse en juillet 2004.

Il a semblé utile que chacune de nos deux sociétés soit présentée aux adhérents de l'autre: c'est ainsi que je vais vous décrire brièvement la SMF, tandis que votre présidente Christiane Rousseau présentera la Société Mathématique du Canada aux membres de la SMF dans notre Gazette.

La S.M.F.

La Société Mathématique de France a été fondée le 6 novembre 1872 par Michel Chasles, qui se trouve être le premier français membre de la London Mathematical Society. Il a été le premier président de la SMF, élu pour un an. Cette nouvelle société savante (association reconnue d'utilité publique par décret du 11 février 1888) annonce, dès l'article 1 de ses statuts, publiés dans le premier numéro de son bulletin: « Elle a pour but l'avancement des sciences et la propagation des études de mathématiques pures et appliquées. Elle y concourt par les travaux et par la publication des mémoires de ses membres. »

Notre société a été créée pour servir de lien entre les mathématiciens. Au moment de la création de la SMF, la communauté mathématique française était très restreinte, quasiment de taille familiale. Avec le développement des mathématiques, le nombre de mathé-

maticiens travaillant en France a considérablement augmenté pour dépasser 5000 (si on se réfère à la dernière édition du *World Directory of Mathematicians*); actuellement notre société compte près de 2000 membres.

Publications

Dès le début, une des missions que s'est fixée la SMF a été de publier des textes mathématiques. En 1873, juste un an après la création de la SMF, est paru le premier numéro du *Bulletin de la Société Mathématique de France*, qui publie des articles originaux dont les résultats doivent être entièrement démontrés. Maintenant, en plus de la version imprimée de façon traditionnelle, une édition électronique est disponible pour les abonnés. Le catalogue de nos publications s'est progressivement étoffé. Depuis 1964 le Bulletin a été complété par un supplément, les Mémoires, consacré en priorité à des monographies ou à des séries d'articles centrés sur un même sujet. La revue *Astérisque*, créée en 1973 à l'occasion du premier centenaire de la Société Mathématique de France, publie des monographies, des colloques internationaux ainsi que le Séminaire Bourbaki. La *Revue d'Histoire des Mathématiques*, inaugurée en 1995, publie des articles originaux. Parmi les autres séries citons *Panoramas & Synthèses* (monographies de synthèses de haut niveau s'adressant à des mathématiciens non spécialistes du sujet), *Cours Spécialisés* (cours de troisième cycle en français et en anglais, pour les étudiants et les doctorants), ainsi que *Séminaires & Congrès*, consacré aux actes de rencontres mathématiques, dont la version électronique est disponible gratuitement sur le serveur. La série la plus récente est *Documents Mathématiques*; elle publie des textes présentant un intérêt historique. La correspondance entre Grothendieck

and Serre, parue dans l'un des premiers fascicules de cette série, va être traduite en anglais grâce à un accord qui vient d'être passé entre la SMF et l'AMS. En plus de ces séries régulières, la SMF publie sporadiquement d'autres textes mathématiques, comme la réédition des Séminaires Bourbaki de 1948 à 1968. Nous sommes ainsi le principal éditeur en France d'ouvrages et de revues de mathématiques de haut niveau. Un pourcentage important de ce que nous publions est en français; mais nous avons un accord avec l'American Mathematical Society pour la traduction anglaise de certaines monographies parues dans l'une ou l'autre de nos collections: c'est la série *SMF/AMS Texts & Monographs*. Nous avons aussi avec l'AMS un accord pour la diffusion de nos publications.

De nos jours la numérisation est une préoccupation de tous les éditeurs. Nous nous reposons sur le programme *NUMDAM* (numérisation de documents mathématiques), piloté par la Cellule MathDoc (unité mixte du CNRS – Centre National de la Recherche Scientifique – et de l'Université de Grenoble) qui participe au programme international de la Digital Mathematical Library.

Rencontres

Chaque année un samedi à la mi-juin nous avons notre «Journée Annuelle» au cours de laquelle se tient l'Assemblée Générale Ordinaire Annuelle de la SMF, suivie d'activités scientifiques centrées autour de trois ou quatre exposés sur un sujet d'intérêt général. Par exemple le 16 juin 2001, le sujet était *Mathématiques et Mathématiciens au XXème siècle*, le 15 juin 2002, c'était *Biologie Mathématique*, tandis que le 14 juin 2003 ce sera *Groupes et Géométrie*.

Cette journée annuelle est aussi l'occasion, un an sur deux, de décerner le *Prix d'Alembert* de la SMF, qui récompense une œuvre ayant contribué à faire connaître les mathématiques au grand public. En 2002 nous avons aussi décerné le *Prix Anatole Decerf 2002* de la *Fondation de France* dont l'objectif est de promouvoir la pédagogie des mathématiques. En 2000 nous avons célébré l'Année Mondiale des Mathématiques en décernant quatre *Prix d'Alembert des Lycéens* : les lauréats, sélectionnés par des lycéens, sont des mathématiciens ayant donné des exposés de mathématiques compréhensibles par des élèves des lycées. Ce prix a eu un tel succès que nous envisageons de renouveler l'expérience en 2004.

La recherche mathématique croît à un rythme élevé. Il est de plus en plus important de se tenir informé des nouveaux développements. C'est pourquoi la SMF organise deux fois par an des « sessions de la recherche », au cours desquelles des spécialistes présentent l'état de leur sujet et les derniers développements à d'autres mathématiciens et à des étudiants de troisième cycle. Ainsi, en décembre 2001, à l'Université de Nantes, le thème était *Foncteurs polynomiaux, modules instables et cohomologie des schémas en groupes finis* ; en mai 2002, à l'Université Paris Nord, c'était *Opérateurs de Schrödinger aléatoires: méthodes, résultats et perspectives*, tandis que pour 2003 les sujets seront *Dynamique presque hyperbolique* et *Aspects probabilistes de l'imagerie mathématique*. Certains de ces exposés sont ensuite publiés dans la série *Panoramas et Synthèses*.

Nous organisons des conférences internationales avec d'autres sociétés savantes: la première a eu lieu à Lyon (juillet 2001) avec l'AMS; la seconde

se tient à Nice en février 2003, nous l'organisons avec l'EMS (*European Mathematical Society*) et la SMAI (Société de Mathématiques Appliquées et Industrielles). Et, comme vous le savez, nous avons rendez-vous à Toulouse du 12 au 15 Juillet 2004 pour le Congrès Canada/France des Sciences Mathématiques (*Joint Canada/France Meeting in the Mathematical Sciences*) que nous organisons ensemble, SMF et SMC, avec la SMAI, la SdS (Société Française de Statistique), et la SSC (Société canadienne de statistiques) avec le support de la SCMAI (Société canadienne de mathématiques appliquées et industrielles).

Éducation

Comme la SMF s'intéresse à tout ce qui concerne les mathématiques, les questions d'éducation sont une de nos principales préoccupations. Notre société a contribué à la création d'un groupe de réflexion, qui est à l'origine de la *Commission de Réflexion sur l'Enseignement des Mathématiques* (CREM), dirigée par Jean-Pierre Kahane, à laquelle le Ministre de l'Éducation a confié une mission officielle. Un rapport d'activité a été publié en 2002: (*L'Enseignement des Sciences Mathématiques*, éd. Odile Jacob).

Que les mathématiciens participent à la définition des programmes d'enseignement scolaire est important, mais il faut aussi présenter les mathématiques aux élèves des collèges et lycées de manière plus ludique: c'est le but de plusieurs associations; certaines ont été créées à l'initiative de la SMF, d'autres sont soutenues par notre société. Deux exemples sont Animath et Math en Jeans, qui permettent à des jeunes de s'amuser tout en faisant des maths.

Chaque année notre Commission d'Enseignement organise une ren-

contre pour étudier un aspect précis du sujet. En janvier 2002 une table ronde a été consacrée au thème: *Mathématiques et enseignement des sciences*, tandis qu'en janvier 2003 nous nous intéresserons à la réforme de l'enseignement universitaire dans la perspective européenne: *Les Mathématiques dans les nouveaux cursus universitaires* (licence master doctorat). Nous avons aussi des contacts réguliers avec des associations comme l'APMEP (Association des Professeurs de Mathématiques de l'Enseignement Public) et l'UPS (Union des Professeurs de Spéciales).

Le CIRM à Luminy

Les mathématiciens ont besoin de travailler ensemble, soit en petits groupes, soit en participant à des conférences ou des colloques. C'est pourquoi la SMF a été à l'origine de la création du CIRM (*Centre International de Rencontres Mathématiques*) à Luminy (près de Marseille) en 1981. C'est un institut analogue à celui d'Oberwolfach en Allemagne ou du centre de Banff au Canada: le superbe environnement de la montagne est remplacé par la proximité de la mer Méditerranée et des calanques. L'idée de base est la même: offrir les meilleures conditions possibles à des mathématiciens qui souhaitent travailler en groupe. Le CIRM dispose de salles de conférences, d'équipements informatique et audio-visuel. Avec 70 000 volumes sa bibliothèque mathématique est la plus importante de France. Avec la SMF, les tutelles administratives du CIRM sont le CNRS et le Ministère de la Recherche, qui fournissent le financement. Le CIRM joue un rôle international, mais aussi régional, car il interagit avec les autres centres universitaires marseillais, notamment l'Université d'Aix Marseille II (Luminy).

Le rôle de ce centre de recherche est d'organiser des conférences internationales regroupant des mathématiciens et des chercheurs dans des domaines connexes (physique théorique, informatique, intelligence artificielle, théorie de l'information, biologie mathématique) venant de toutes les parties du monde. Typiquement un tel colloque dure une semaine et regroupe entre 30 et 60 participants. Quelques rencontres un peu plus longues sont aussi parfois organisées, ainsi que des cours intensifs ou des écoles d'été pour des jeunes chercheurs, des doctorants ou des thésards. La capacité d'accueil de ce centre a récemment augmenté, et maintenant près de 80 participants peuvent être hébergés. Un nouveau programme de recherche en petits groupes a démarré en 2001; par exemple cela permet d'accueillir des mathématiciens qui préparent un article en commun. Des travaux en cours vont améliorer encore l'accueil —en particulier un nouvel auditorium est en construction.

L'ouverture internationale est complète: il n'est pas du tout nécessaire qu'un des organisateurs soit français. N'hésitez pas à visiter le site web <http://www.cirm.univ-mrs.fr/> et à soumettre une proposition de colloque au conseil scientifique du CIRM.

Relations avec d'autres sociétés savantes

J'ai déjà mentionné la SMAI: elle a été fondée en 1983 par un groupe de mathématiciens appliqués. Nos deux sociétés entretiennent des liens étroits, et nous avons plusieurs actions en commun. L'une d'elles, qui fait aussi intervenir la SFP: Société Française de Physique, porte sur la coopération avec les pays en développement; nos trois sociétés viennent de créer une cellule *Sciences de Base et Coopération*

pour coordonner nos actions dans ce domaine. La France héberge le CIMPA (Centre International de Mathématiques Pures et Appliquées) qui organise des écoles dans les pays en développement, avec le soutien de l'UNESCO. Notre société encourage ces activités, tout en regrettant que le CIMPA dispose de trop faibles moyens.

Une autre action commune de la SMF et de la SMAI concerne plus spécialement les jeunes mathématiciens: l'Opération Postes diffuse aussi largement que possible et en temps réel les informations concernant les ouvertures de postes de Maîtres de Conférences, de Professeurs ou de Chercheurs au CNRS. Le système bureaucratique français d'attribution des postes universitaires est assez compliqué et mériterait plus d'explications, mais il est régulièrement modifié et celui qui est en vigueur actuellement sera vraisemblablement modifié bientôt.

Une brochure intitulée *Explosion des Mathématiques* a été publiée en 2002 grâce aux efforts combinés de la SMF et de la SMAI. Le but de ce fascicule est de promouvoir les mathématiques, de les faire connaître à un large public, principalement celui des « décideurs ». Vous pouvez le télécharger gratuitement sur le site de la SMF.

De nos jours la communication joue un rôle central dans la plupart des activités. Pour la communication interne, l'Officiel des Mathématiques (qui est aussi disponible gratuitement sur notre site depuis 1998) regroupe chaque mois les informations sur les séminaires et rencontres mathématiques. La Gazette des Mathématiciens (déjà citée) peut être comparée aux Notes de la SMC: elle publie des informations sur différents sujets susceptibles d'intéresser nos membres.

Sur notre site internet <http://smf.emath.fr> se trouvent de multiples informations concernant notre société, avec un annuaire des membres, des formulaires de commande de publications, des informations sur les publications, les conférences, les rencontres, et bien d'autres choses que nous vous invitons à découvrir.

Nos deux sociétés, la SMF et la SMC, ont signé des accords de réciprocité. Nous espérons qu'un nombre encore plus grand d'adhérents de la SMC souhaiteront en bénéficier en adhérant à la SMF. Et nous espérons aussi, bien sûr, que de nombreux collègues canadiens nous feront le plaisir de venir à Toulouse en juillet 2002.

Pour toute information supplémentaire:

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Institut Henri Poincaré

NEWS FROM INSTITUTES

CRM-Fields Prize Announcement / Prix CRM-Fields Annoucé

The two joint winners of the CRM-Fields prize for mathematics for 2002-2003 are John McKay and Edwin Perkins. The prize, awarded annually by the Centre de Recherches Mathématiques in Montreal and the Fields Institute in Toronto recognises exceptional contributions by a mathematician working in Canada. The committee had two excellent nominees this year and decided to award a joint prize. Both will give talks on their work at the two institutes next fall.

Professor John McKay of Concordia University's work revolves around the properties of finite groups, their representations and their symmetries. He has been at the origin of several of the most startling discoveries in mathematics of our time, and is world-renowned for launching two areas of mathematics by his observations and conjectures, one known as the McKay correspondence, and the other going under the fanciful name of "monstrous moonshine", underlying the role of the largest sporadic simple group which is known as the Monster. His wide knowledge of mathematics has allowed him to bring to the fore questions which have been deeply influential in the subsequent development of the discipline, for example the work of Richard Borcherds which was recognised by a Fields medal at the 1998 International Congress of Mathematicians.

Professor McKay, amongst other achievements, is a pioneer in the use of computers as a tool in algebra, either in the study of sporadic groups (he is the co-discoverer of two such groups) or in the explicit computation of Galois groups. He was also one of the principal actors in one of the feats of computational algebra of our time, the proof of the non-existence of a projective plane of order 10.

After obtaining his bachelor's degree in mathematics at Manchester, he went on to obtain a doctorate in computer science in Edinburgh. He held appointments at the Atlas laboratory in England, at Caltech and at McGill University before moving to Concordia in 1974.

Edwin Perkins received his B.Sc. in mathematics from the University of Toronto in 1975 and his Ph.D. from the University of Illinois (Urbana) in 1979. He is currently Professor of Mathematics and holds a Canada Research Chair at the University of British Columbia, where he has been since 1979. He received the Rollo Davidson prize for young probabilists in 1983, and the Canadian Mathematical Society's Coxeter-James and Jeffrey-Williams Prizes in 1986 and 2002. He was elected Fellow of the Royal Society of Canada in 1988 and held an NSERC Steacie Fellowship during 1992-94.

Edwin Perkins has made outstanding contributions to several areas of probability theory and is one of the world's leading probabilists. Much of his early work concerned the delicate analysis of the sample paths of stochastic processes. His most spectacular achievements are his contributions to the analysis of measure-valued diffusions, or "superprocesses," where he has been a pioneer in the development of the field. His accomplishments include deep and surprising results about the support of super-Brownian motion including identification of its Hausdorff dimension, the identification of the historical process as the correct way to understand genealogy in superprocesses, and the construction of a class of interacting superprocesses.



Les deux lauréats de 2002-2003 du prix CRM-Fields en mathématiques sont John McKay et Edwin Perkins. Le Prix, décerné à chaque année par le Centre de Recherches Mathématiques à Montréal et l'Institut Fields à Toronto, reconnaît des contributions exceptionnelles de mathématiciens oeuvrant au Canada. Le comité du prix avait deux excellentes nominations cette année et a décidé de donner un prix conjoint. Les deux feront une conférence sur leurs travaux à chaque institut cet automne.

L'oeuvre du professeur John McKay, de l'Université Concordia, est centrée sur les propriétés des groupes finis, de leurs représentations et de leurs symétries. Il est à l'origine de plusieurs des découvertes les plus surprenantes de notre époque, et est reconnu à travers le monde pour son rôle d'initiateur, par ses observations et conjectures, de deux domaines importants des mathématiques. La première porte son nom et s'appelle la correspondance de McKay; la deuxième a le sobriquet anglais de « monstrous moonshine », ce qui reflète le rôle essentiel du groupe sporadique le plus gros, qui s'appelle le Monstre. La grande culture mathématique de John McKay lui a permis d'amener à l'avant-plan des questions qui ont été profondément influentes dans le développement subséquent de la discipline, par exemple le travail de Richard Borcherds qui a été couronné d'une médaille Fields au congrès international des mathématiciens de 1998.

Le professeur McKay a aussi été un des pionniers de l'utilisation de l'ordinateur comme outil en algèbre, soit pour l'étude de groupes sporadiques (il est co-découvreur de deux de ces groupes), soit pour le calcul explicite de groupes de Galois. Il était aussi un des principaux

participants à un des tours de force d'algèbre calculatoire de notre époque, la démonstration de la non-existence du plan projectif d'ordre 10.

Après avoir fait son baccalauréat en mathématiques à Manchester, il a obtenu son doctorat en informatique à Édimbourg. Il a occupé des postes académiques aux Laboratoires Atlas en Angleterre, à Caltech et à McGill avant de prendre un poste à Concordia en 1974.

Edwin Perkins a reçu son B.Sc. en mathématiques de l'université de Toronto en 1975 et son Ph.D. de l'université d'Illinois (Urbana) en 1979. Il est en ce moment professeur de mathématiques et détenteur d'une chaire de recherche du Canada à l'université de Colombie-Britannique, où il se trouve depuis 1979. Il a reçu le prix Rollo Davidson pour les jeunes probabilistes en 1983, et les prix Coxeter-James et Jeffrey-Williams de la Société Mathématique du Canada en

1986 et 2002. Il a été élu membre de la Société Royale du Canada en 1988 et était boursier Steacie en 1992-94.

Les contributions d'Edwin Perkins aux probabilités sont nombreuses et touchent à bien des sujets; elles lui ont valu une renommée mondiale. Beaucoup de son travail en début de carrière touchait à une analyse très fine des échantillons de chemins de processus stochastiques. Ses travaux les plus spectaculaires touchent à l'analyse de diffusions à valeurs dans les mesures, les « super-processus », domaine dont il est un des pionniers. Ses accomplissements comprennent des résultats profonds et surprenants sur le support du mouvement super-Brownien dont l'identification de sa dimension de Hausdorff, l'identification du processus historique comme la méthode correcte pour comprendre la généalogie dans les super-processus, et la construction d'une classe de super-processus avec interactions.

NEWS FROM DEPARTMENTS

Dalhousie University, Halifax, N.S.

Promotions

Jeannette Janssen (to Associate Professor, July 2003)
Ed Susko (Associate Professor, July 2003).

Appointments

N. Pelevas (PDF, September 2002, Relativity),
J.P. Grossman (PDF, January 2003, Combinatorics)

Death

Micheal Edelstein (see Obituary in this issue).

McGill University, Montreal, QC

Appointments

Ravi Ramakrishna (CRC Chair, Associate Professor, July 2002, Number Theory).

Promotions

Marta C. Bunge (Emeritus Professor - January 2003).

Retirements

Bohdan Lawruk (August 2002).

Université Laval, Québec, QC

Appointments

Thierry Duchesne
(Assistant Professor, Statistics, January 2003),
Jérémie Rostand
(Assistant Professor, Spectral Theory, January 2003).

Retirements

Robert Côté has retired January 2003. He was a statistician who served as head of the department from 1986 to 1992. Herv Morin will retire in July 2003. He is busy writing a history of the department with Charles Cassidy.

Awards/Distinctions

Professor Tom Ransford (Canada Research Chair, Spectral Theory, October 2002).

University of Lethbridge, Lethbridge, AB

Resignation

Dave Cowan has resigned to accept a position at the University of Saskatchewan

OBITUARY / AVIS DE DÉCÈS

Michael Edelstein

By Leah Keshet

Michael Edelstein was born to a respected, well-to-do, traditional Jewish family on March 21, 1917 in Mława, Poland, close to East Prussia's border. Mława changed hands repeatedly: it had belonged to the Russian Empire from 1864, became Prussian in 1914, and from 1918 was part of Independent Poland. His grandfather, Zisha Zilberberg, owned a large brick tenement building and a grocery store; his father, Baruch, prospered in the leather trade.

As a young child, Michael received a Jewish education. During his impressionable teen years, Michael discovered a copy of Darwin's *Origin of Species* abandoned in his grandfather's attic by a fleeing soldier. The discovery led him towards a life of science, and away from religion. As an adolescent, he excelled in studies at Mława's secular Jewish Gymnasium, showing early promise in mathematics and physics. He was an avid reader, astute in current events, and a scholar of history, who retained detailed knowledge of turbulent events of the two centuries spanned by his life.

Rising anti-Semitism in Poland of the 1920's and 30's blocked higher education for Jews (via "Numerus Clausus", the quota system). His sister Sarenka persuaded Michael to study abroad at the fledgling Hebrew University of Jerusalem (in then Palestine). He arrived alone in that bewildering land in 1937. There he struggled with the language and culture, and was beset by loneliness, and homesickness. Ultimately, this dislocation spared his life. The firestorm that erupted over Europe in 1939 was to consume his family in the holocaust. On the Mt. Scopus campus of Hebrew U., he was part of a circle of brilliant students, many becoming leading scholars of their times. Conditions were rough, stipends meager, and hunger and deprivation were rampant. War interrupted his studies: With the onset of WW II, Michael enlisted in the British Army, serving in Italy and Egypt. He later fought in the Israeli War of Independence in 1948, and participated in defense research, putting his mathematics to work computing trajectories of the notoriously inaccurate but frightful "Davidka" artillery. He never forgot nor forgave



*Michael Edelstein, D.Sc.
1917-2003*

By Tony Thompson

Michael Edelstein was a geometer, an inspiring teacher, a distinguished colleague, a diligent member of the CMS, an ardent and accomplished chess player, and an outstanding human being and friend. The Canadian mathematical community has lost one of its more remarkable personalities. The 20th century was one of horrors and human suffering. These fell especially heavily on Michael and it is a remarkable testament to his fortitude that he survived so well, for so long and accomplished so much.

Michael came to North America with his family in 1962. They moved first to Cornell and then to Michigan (East Lansing) where L.M. Kelly became a life-long friend. Then, in 1964, Michael was appointed to the Mathematics Department at Dalhousie while his wife, Tikvah, obtained a position at the NRC laboratory in Halifax. At that time the

Dalhousie department was small, and was mainly an undergraduate teaching department with few people doing research. Michael brought a new outlook and attracted new people to the department. It was largely on his reputation that the Ph.D. programme was established and he supervised the first of those degrees. He initiated graduate classes and seminars. He was an outstanding presence in the department for the next two decades. During that time he suffered the devastating loss of Tikvah at the tragic age of 51. He retired in 1982 and was appointed Professor Emeritus that year. From 1984 to 1986 he held the Obed Edmund Smith Professorship of Mathematics at Mount Allison University.

As is explained by his tumultuous early life, Michael's mathematical career began late. His first paper dealt with the topology of the plane and appeared in 1952. The first papers to attract attention outside Israel dealt with generalizations of the Banach contraction mapping principle. He considered mappings on a metric space with Lipschitz constant 1: both contractive mappings (when the inequality is strict for distinct points) and non-expansive. His ideas were simple but powerful and with conditions considerably weaker than compactness he was able to prove the existence of fixed points and, under different conditions, periodic points. These papers opened the way to a huge literature on the subject but he did

the right-wing revisionist Irgun and Stern Gang commandos for their massacre (in April 1948) of Arabs in Deir Yassin, whose horrifying aftermath he witnessed in person.

The 1950's were years of happiness and rejuvenation. He was reunited, in Israel, with his sister, the single family member who had survived Auschwitz. In 1951, Michael married a warm, caring, beautiful native bride, Tikvah Segal, and two years later, their only daughter was born. The couple struggled to make ends meet while completing higher degrees, Michael a mathematics DSc (Technion, 1960) and Tikvah a Botany PhD (Hebrew U., 1961).

In 1962, the family undertook a journey (through Ithaca, NY, and Michigan) that eventually led them, in 1964, to a new home in Canada. Michael was recruited as a mathematics professor at Dalhousie University (Halifax, NS), where he became a founder of the mathematics graduate and research program. He inspired colleagues, trained students, carried out research, and taught there for over two decades before his retirement, and relocation to BC.

Michael saw his own life as a series of personal losses: of his beloved mother Ester-Leah (when he was 6), of his young wife (at age 51), his sister in later life, and many others. By age 85, he had outlived an entire generation of kin. He struggled with internal demons in personal interactions, often leaving friends and loved ones grieving over sudden, inexplicable estrangements. A miraculous reunion with his once-estranged daughter, in recent years, led to a close bond that remained unbroken until his dying day, Jan 27, 2003, in Vancouver, BC.

Michael was an exceptional chess player (gaining the title of International Master in Correspondence Chess in the 1990's), but mathematics was his first lifelong love and passion; he never tired of transmitting that passion to students and even to casual acquaintances. While infirm with Parkinson's Disease, at advanced age, he took pleasure in his mathematics books, and braved some of the most notoriously challenging problems in mathematics. He is survived by daughter, Leah Keshet (who followed his footsteps to become a mathematician), son-in-law, Joshua, and grandsons, Aviv, and Ilan.

(This essay originally appeared in Facts&Arguments in the Globe and Mail.)

not participate in this mathematical industry. Instead he concentrated on two related but more difficult problems. The first, still unsolved, is whether a non-expansive map on a weakly compact convex subset of a Banach space necessarily has a fixed point. It was an attempt to solve this problem that led to his notion of an *asymptotic centre* for the orbit of a point under a non-expansive mapping. This idea was used with great effect by T.C. Lim in his Ph.D. thesis under Michael's direction.

The second direction was suggested by Dr. L. Janos in 1965. It was whether one could prove a converse to the Banach mapping principle. In other words, if one knew the map had a unique fixed point to which iterates converge, does it follow that the map is a contraction? This greatly intrigued Edelstein and he gave it much thought over several years. He gave a most beautiful proof of the result in a paper called *A short proof of a theorem of L. Janos* in 1969. This, as was always Michael's way, represented considerable generosity because Janos had only conjectured the result. He followed this up with two further, longer papers on the same topic in which he showed that a map of the type indicated above can be represented as the restriction of a homothety (linear + translation) with Lipschitz constant $\kappa < 1$ on a subset of a Hilbert space.

Another early interest was in a quite different branch of geometry, namely combinatorial geometry. A paper in 1957 dealt with a generalization of Sylvester's problem. His interest in this area received much stimulation by his contact with L.M. Kelly and he would frequently return to problems of this kind as a kind of relaxation from infinite dimensional problems. Daryl Tingley wrote his Master's thesis on these topics under Michael's direction.

The subject on which he wrote the largest number of papers may be rather vaguely described by the term *Geometry of Banach spaces*. His first paper in this area dealt very briefly, but in a beautiful way, with a result of Krasnoselskii, again on fixed points. But this quickly led on to a wider range of ideas. He has a number of papers dealing with nearest and farthest points. Here the problem is to consider a set A (usually at least closed, bounded and convex) and a point b and ask whether there is a point in A which is nearest to (farthest from) b . With varying conditions on the set A and on the unit ball of the Banach space he obtained a variety of results. One of the nicest of these is that under certain conditions the set of points b having a farthest point in A is dense in the whole space. Another major contribution was his notion of *entability*. This is closely related to the Radon-Nikodym property and is of great importance in the modern theory of Banach spaces. Several of his papers deal with the question of hyperplanes that support a convex set. He was especially interested in whether it is possible to have hyperplanes that support two (or more) sets. One of his more frequently cited papers shows that

continued on next page

there are two sets in c_0 which have no common supporting hyperplanes. With graduate students, post-doctoral fellows and colleagues he worked on a great variety of geometrical questions in Banach spaces. In tackling these he always began by thinking geometrically, attempting to visualize the ways in which lines, hyperplanes and convex sets can behave under the given circumstances. Having seen the geometrical relationships, he would then go on to express them in precise analytical statements. He always had an abundance of problems and one of the hall marks of his career was his ability to stimulate younger people by discussing problems with them and offering insight and good ideas. Looking down his list of publications one is struck by the variety of subject matter and by the variety of co-authors.

Michael was an inspiring teacher. This is made evident by the following quotation from a Professor of Medicine at Dalhousie: "I had the pleasure of studying an undergraduate calculus course in a class taught by Dr. Edelstein just prior to his retirement from Dalhousie. He was a wonderful and enthusiastic teacher and always found extra time to discuss calculus and mathematics with his students. His classes from that year have left me with some very positive memories and I'm sure with many others who were his fortunate students."

Throughout his life, Michael was a keen chess player. He liked nothing better than to challenge someone to a game in the

coffee lounge. After retirement, he played chess in a serious way by correspondence and gained the title of International Master. He also took a very active interest in world affairs. He enjoyed the New York Times and would read the Sunday edition almost in its entirety. He would follow this up by quizzing colleagues about events, politicians or books. He had a dry sense of humour. He hated any kind of self promotion and was adept at deflating pretentiousness. Michael remained mathematically active and alert. Some 10 or 11 papers were published after his retirement and he was working on difficult problems until very recently.

For the Canadian Mathematical Society, Michael Edelstein served on the Board (1969-71), on the Publications Committee (1974-76 and 1980-81), on the Nominating Committee (1971-73). He was Editor-in-Chief of the Bulletin for five years, 1975-80. He also served on the NSERC grants committee and advocated something very similar to the awards for leading mathematicians that became a reality with the recent reallocation exercise.

Master's students: A. Finbow, D.K. Gandhi, M.T. Kiang, J.E. Lewis, T.C. Lim, B. Sas, H. Saunderson, D. Tingley, J. Wright.

Doctoral Students: R.D. Holmes, M.T. Kiang, J.E. Lewis, T.C. Lim, P.P. Narayanaswami, D. Paulowich.

SUCCESS (continued from page 1)

Canadian Journal of Mathematics and the *Canadian Mathematical Bulletin* are produced in camera-ready form and on schedule. The T_EX Office staff, in conjunction with Executive Office staff, ensures that all the abstracts for our semi-annual meetings are processed and made available on the CMS web site, and also provides some technical support for the CMS Book Series. The T_EX Office has one full-time assistant (Laura Kirland) who works on site, and a part-time assistant (Shelly Ames), located at the University of Calgary. Another important individual associated with the T_EX Office is the Production Editor (S. Swaminathan - Dalhousie)

For the past several years, as part of an agreement between the CMS and the Division of Mathematical and Physical Sciences of the Royal Society of Canada, the Executive Office and the T_EX Office has provided subscription and T_EXing services for *Mathematical Reports of the Academy of Science*. In 2002, the T_EX Office has also provided T_EX services for the *Canadian Applied Mathematics Quarterly*. The CMS hopes to expand these contracted services and has developed a series of models and prices depending on the scope of the services required.

In 2003, the T_EX Office will become the Publications Office, but will remain at the University of Manitoba. Craig Platt will be taking over from Michael Doob as the Technical Editor, Michael will assume the role of Technical Consultant, and S.

Swaminathan will be the Associate Technical Editor. The position of CMS Publisher is still vacant but it is hoped that the position will be filled by mid-2003.

The editorial offices for the various publications for 2002 were as follows:

Canadian Journal of Mathematics
Editors-in-Chief (Henri Darmon
and Niky Kamran – McGill University)

Canadian Mathematical Bulletin
Editors-in-Chief (James D. Lewis and Arturo Pianzolo –
University of Alberta and Noriko Yui – Queen's University)

CRUX with MAYHEM
Editor-in-Chief (Bruce Shawyer – Memorial University)

CMS Notes
Editors-in-Chief (Peter Fillmore
and S. Swaminathan – Dalhousie University)

CMS Book Series
Editors-in-Chief (Jonathan Borwein
and Peter Borwein – Simon Fraser University)

CMS Tracts in Mathematics
Editors-in-Chief (Kenneth Davidson
and Cameron Stewart – University of Waterloo)

ATOM - A Taste of Mathematics
Editor-in-Chief (Tony Thompson – Dalhousie University)

Electronic access to our publications is an important and increasing aspect of our publishing activities. The electronic delivery of our publications is made possible through the efforts of the Digital Editor (Loki Jörgenson) and the Assistant (Judith Borwein). In the new structure for the Publications Office, the position of Digital Editor has been eliminated but it is hoped Loki Jörgenson will provide assistance as a Digital Consultant. Judith Borwein will continue as the Assistant Digital Editor.

As is evident from the other reports, much has been accomplished in 2002. The Summer Meeting, hosted by Laval University, and the Winter Meeting, hosted by the University of Ottawa, were both considerable successes and thanks go to the meeting directors, the organizers, and the Executive Office and local staff who made sure everything ran smoothly. All the publications continued to appear on or ahead of schedule, and the CMS Book Series is progressing very well with 12 books in print and 5 to be released in 2003.

The Society's 2002 competition program was very successful. Eighty students from 47 schools, wrote the 2002 Canadian Mathematical Olympiad. The Chair of the CMO Committee for 2002 was Daryl Tingley and the Society is very appreciative of his excellent work on both the CMO Committee and the Mathematical Competitions Committee for the past several years. The six students who represented Canada at the 2002 International Mathematical Olympiad in Glasgow did extremely well. Canada placed 12th out of 84 countries—a result which can be considered the best showing ever! The Asian Pacific Mathematics Olympiad (APMO), an international contest written in each participating country, has Canada as the Senior Coordinating Country for 2002, 2003 and 2004. A sub-committee, chaired by Bill Sands (University of Calgary), has been established to administer the APMO for these three years. Bill is also the Chair of the Society's IMO Committee.

The Society's last competition each year, the Canadian Open Mathematics Challenge, is really the start for the following year. Almost 6000 students participated in the 7th Open which was written on November 27, 2002. Largely based upon their performance on the Open, 85 students are being invited to write the 34th CMO in March 2003. The Open is organized in collaboration with the Centre for Education in Mathematics and Computing (CEMC – University of Waterloo) and I wish to thank Peter Crippin and the staff at the CEMC for all their efforts in making the Open such a successful national competition. Efforts continue to find a Title Sponsor for the Open.

Excellent performance in national and international competitions requires highly talented students. But training is also crucial. To all of the competition committee members, to the leaders, the coaches, the teachers and to the parents: congratulations on a good year. To Sun Life Financial (the

Major Sponsor of the CMO) and the other corporate sponsors, to the provincial governments who support our educational activities, to the "Centre de recherches mathématiques", the Fields Institute for Research in the Mathematical Sciences, and the Pacific Institute for the Mathematical Sciences, and to all the host universities: many thanks for your on-going help with these important activities and for support of the Society's Math Camps Program.

The National and Regional Math Camps Program has been one of the Society's most successful new programs. Further details regarding the 2002 Math Camps are given in the Annual Report of the Mathematical Competitions Committee (MCC). To-date, the Math Camps have been the responsibility of the MCC. The Camps, however, are not competition based. A change is being considered which would create the position of a Math Camps Coordinator who would oversee the annual Math Camps Program. It is anticipated the Coordinator will be an ex-officio member of the MCC and the Education Committee. I am delighted to report that the Imperial Oil Charitable Foundation will continue as the Title Sponsor for these Camps for the next three years. For 2001, 2002, and 2003, the Camps also have been supported through a grant from NSERC PromoScience. It is hoped that this grant will be renewed and possibly increased for 2004 onwards.

During 2002, Eric Muller (Brock University) has continued with the development of the Canadian Virtual Math Trail (www.BrockU.ca/cmt/). By the fall of 2003, with help from local teachers and colleagues, it is hoped their will be at least one site on the trail from every province. With this foundation, a national launch of the Trail is anticipated towards the end of 2003. Thanks to the efforts of Judith McDonald (Washington State University) and Harley Weston (University of Regina) the project "Mathematics with a Human Face" has made substantial progress. A number of profiles have been produced (<http://mathcentral.uregina.ca/humanface/>) and four of these will be featured on a poster that is currently being prepared. Copies of this poster will be sent to all high schools, colleges and universities in Canada, and to other agencies both inside and outside Canada.

In conclusion, I wish to thank the outgoing chairs of the Education Committee (Edward Barbeau - University of Toronto), the Electronic Services Committee (Jason Brown - Dalhousie University), the Publications Committee (Keith Taylor - University of Saskatchewan) and the Research Committee (Douglas Stinson - University of Waterloo) for all their efforts on these important committees.

Many individuals, institutions, companies and agencies have helped make 2002 be a most successful year, to them, we also extend our thanks

Graham P. Wright

RAPPORT DU DIRECTEUR ADMINISTRATIF - 2002

L'effort collectif mène à la réussite

Le rapport annuel 2002 de la présidente, du trésorier et des présidents de nos 12 comités permanents montrent encore une fois la vaste gamme d'activités de recherche, de publication et d'éducation gérées et appuyées par la SMC. Au lieu de reprendre les points déjà traités dans les autres rapports, je ferai surtout ressortir les activités administratives que nous menons d'un bout à l'autre du pays, les faits saillants de 2002 et ceux à surveiller en 2003.

En tant que directeur administratif, je suis bien placé pour voir l'excellent service que la Société reçoit non seulement du personnel à temps plein ou partiel du bureau administratif logé à l'Université d'Ottawa, mais aussi du personnel des nombreux autres bureaux de rédaction ou autres dispersés à la grandeur du Canada. En outre, la SMC bénéficie du travail d'un grand nombre de bénévoles qui contribuent à ses conseils de rédaction, à ses comités, à l'organisation de ses Réunions semestrielles, à ses activités éducatives et autres. L'appui reçu des nombreuses universités associées à notre cause est un élément crucial qui permet à la Société d'offrir une vaste gamme d'activités tout en limitant les coûts.

Toutes les activités de la Société sont coordonnées par le bureau administratif. Le personnel à temps plein comprend une chef des opérations (Monique Bouchard), un webmestre (Alan Kelm), une comptable (Diane Ellis), une responsable de l'adhésion et des publications (Liliane Sousa) et une adjointe administrative (Suzanne Lalonde). Caroline Baskerville, adjointe du directeur administratif pendant quatre ans, a quitté son poste en juin 2002 et a été temporairement remplacée jusqu'à la fin 2002. En janvier 2003, nous avons eu le plaisir d'accueillir Nathalie Blanchard, qui occupera désormais ce poste. En plus de ces six employés à temps plein, d'autres personnes travaillent au bureau à temps partiel, notamment au niveau des bases de données, du site Web et du soutien informatique.

Le bureau de rédaction T_EX, situé à l'Université du Manitoba et dirigé par Michael Doob, veille à la production en format prêt-à-tirer de nos deux revues (le Journal canadien de mathématiques et le Bulletin canadien de mathématiques) et au respect du calendrier de publication. Son personnel, en collaboration avec celui du bureau administratif, prépare tous les résumés en vue de nos Réunions semestrielles et les publie sur le site de la SMC. Il offre en outre son soutien technique pour la collection «Ouvrages de mathématiques de la SMC». Le bureau T_EX bénéficie de l'aide d'une adjointe à plein temps (Laura Kirland), qui travaille sur place, et d'une adjointe à temps partiel (Shelly Ames), qui travaille à l'Université de Calgary. Une autre personne importante associée au bureau de rédaction T_EX est le responsable de la production (S. Swaminathan - Dalhousie).

Au cours des dernières années, dans le cadre d'une entente entre la SMC et la Division des mathématiques et sciences physiques de la Société royale du Canada, le bureau administratif et le bureau de rédaction T_EX ont offert les services d'abonnement et de publication T_EX pour les Comptes rendus mathématiques de l'Académie des sciences. En 2002, le bureau de publication T_EX a aussi offert ses services de production T_EX pour la publication du Canadian Applied Mathematics Quarterly. La SMC espère élargir ces services et a développé des modèles et des listes de prix pour les divers services, en fonction du travail requis.

En 2003, le bureau de publication T_EX demeurera à l'Université du Manitoba, mais deviendra le bureau des publications. Craig Platt prendra la place de Michael Doob à titre d'éditeur technique, Michael deviendra conseiller technique et S. Swaminathan sera le nouvel éditeur technique adjoint. Le poste d'éditeur de la SMC est toujours vacant, mais nous espérons y pourvoir d'ici le milieu de l'année 2003.

Voici la composition des bureaux de rédaction de nos publications en 2002:

Journal canadien de mathématiques

Rédacteurs en chef (Henri Darmon et Niky Kamran – Université McGill)

Bulletin canadien de mathématiques

Rédacteurs en chef (James D. Lewis et Arturo Pianzolo – Université de Alberta et Noriko Yui – Université Queen's)

CRUX with MAYHEM

Rédacteur en chef (Bruce Shawyer – Université Memorial)

Notes de la SMC

Rédacteurs en chef (Peter Fillmore et S. Swaminathan – Université Dalhousie)

Ouvrages de mathématiques de la SMC

Rédacteurs en chef (Jonathan Borwein et Peter Borwein – Université Simon Fraser)

Traité de mathématiques de la SMC

Rédacteurs en chef (Kenneth Davidson et Cameron Stewart – Université de Waterloo)

ATOM – Aime-t-on les mathématiques

Rédacteur en chef (Tony Thompson – Université Dalhousie)

L'accès aux versions électroniques de nos publications occupe une part de plus en plus importante de nos activités de publication. Nous devons les versions électroniques au travail de notre responsable de l'édition (Loki Jörgenson) et de son adjointe (Judith Borwein). Dans la nouvelle structure du bureau des publications, le poste de responsable de l'édition

est éliminé, mais nous espérons que Loki Jörgenson continuera sa contribution à titre de conseiller à l'éditique. Judith Borwein conservera son poste d'adjointe à l'éditique.

Comme vous le constaterez à la lecture des autres rapports, nous avons beaucoup accompli en 2002. La Réunion d'été, tenue à l'Université Laval, et la Réunion d'hiver, à l'Université d'Ottawa, ont toutes deux été très réussies. Nos sincères remerciements pour ces succès aux directeurs des réunions, aux organisateurs, au bureau administratif et au personnel de Laval et d'Ottawa qui ont assuré la bonne marche des activités. Toutes les publications ont été publiées aux dates prévues ou même avant, et la collection «Ouvrages de mathématiques de la SMC» fait de bons progrès: 12 ouvrages ont déjà été publiés et 5 paraîtront en 2003.

Le programme de concours de la Société en 2002 a aussi connu un succès retentissant. Quelque 80 élèves de 47 écoles ont participé à l'Olympiade mathématique du Canada (OMC). En 2002, le président de l'OMC était Daryl Tingley, dont la Société a grandement apprécié l'excellent travail au sein de ce comité et de celui des concours de mathématiques au cours des dernières années. Les six élèves qui ont représenté le Canada à l'Olympiade internationale de mathématiques 2002 à Glasgow ont extrêmement bien réussi. Le Canada s'est classé 12^e sur 84 pays, soit le meilleur résultat à ce jour! En 2002, 2003 et 2004, le Canada est le principal pays coordonnateur de l'Olympiade mathématique Asie-Pacifique (OMAP), une épreuve internationale que les participants subissent dans leurs pays respectifs. On a créé un sous-comité, présidé par Bill Sands (Université de Calgary), qui administrera l'OMAP pendant ces trois ans. Bill est aussi président du Comité de l'OIM de la Société.

Le dernier concours de l'année à la Société, le Défi ouvert canadien de mathématiques, sert de tremplin vers la nouvelle année. Quelque 6000 élèves ont pris part au 7^e Défi tenu le 27 novembre 2002. En grande partie d'après leur résultat au Défi, 85 élèves sont invités à la 34^e OMC en mars 2003. Le Défi est organisé en collaboration avec le Centre d'éducation en mathématiques et en informatique (CEMI - Université de Waterloo). Je tiens à remercier Peter Crippin et le personnel du CEMI pour tout leur travail, qui a fait du Défi un concours national de si grande envergure. Nous cherchons toujours un commanditaire en titre pour le Défi.

Pour si bien réussir à des concours nationaux et internationaux, il faut bien sûr des élèves très talentueux, mais leur formation est aussi cruciale. À tous les membres des comités des concours, aux chefs d'équipe, aux entraîneurs, aux enseignants et aux parents, félicitations pour cette belle année. À la Financière Sun Life (commanditaire principal de l'OMC) et aux autres commanditaires privés, aux gouvernements provinciaux qui soutiennent nos activités éducatives, au Centre de recherches mathématiques, à l'Institut Fields de recherche en sciences mathématiques, à l'Institut du Pacifique pour les sciences mathématiques et

à toutes les universités qui ont accueilli certaines de nos activités: tous nos remerciements pour votre aide constante à ces importantes activités et votre soutien au programme de camps mathématiques de la Société.

Le programme de camps mathématiques régionaux et nationaux est l'une des nouvelles initiatives de la Société qui fonctionne le mieux. Pour plus de détails concernant les camps mathématiques 2002, veuillez consulter le rapport annuel du Comité des concours mathématiques (CCM). Pour l'instant, les camps mathématiques sont sous la responsabilité du CCM. Toutefois, comme ils ne sont pas des concours en soi, on envisage de créer un poste de coordonnateur qui superviserait le programme annuel de camps mathématiques. On s'attend à ce que ce coordonnateur soit membre d'office du CCM et du Comité d'éducation. Je suis très heureux d'annoncer que la Fondation philanthropique Pétrolière Impériale a accepté de renouveler son engagement comme commanditaire en titre des camps pour les trois prochaines années. En 2001, 2002 et 2003, les camps ont aussi reçu l'appui d'une subvention du programme PromoScience du CRSNG. Nous espérons que cette subvention sera renouvelée et peut-être même augmentée pour l'année 2004 et les suivantes.

En 2002, Eric Muller (Université Brock) a poursuivi le développement du Sentier mathématique virtuel pancanadien (www.BrockU.CA/cmt/). D'ici l'automne 2003, avec l'aide d'enseignants et de collègues des provinces, on espère qu'il y aura au moins un site du Sentier dans chacune des provinces. Une fois cette base en place, on envisage de faire un lancement national du Sentier vers la fin de 2003. Grâce aux efforts de Judith McDonald (Washington State) et Harley Weston (Université de Regina), le projet *Mathematics with a Human Face* a réalisé des progrès considérables. Plusieurs profils sont déjà produits (<http://mathcentral.uregina.ca/HumanFace/>), dont quatre seront en vedette sur une affiche en préparation. Cette affiche sera distribuée dans tous les collèges et toutes les écoles et universités du Canada, ainsi que dans d'autres établissements canadiens et étrangers.

En terminant, j'aimerais remercier les présidents sortants du Comité d'éducation (Edward Barbeau – Université de Toronto), du Comité des services électroniques (Jason Brown – Université Dalhousie), du Comité des publications (Keith Taylor – Université de la Saskatchewan) et du Comité de la recherche (Douglas Stinson – Université de Waterloo) pour leur travail au sein de ces importants comités.

Si l'année 2002 a été si réussie, c'est grâce au concours d'un grand nombre de personnes, d'établissements, d'entreprises et de conseils.

Graham P. Wright

ÉDITORIAL - *Au-delà du rêve*

Robert J. MacG. Dawson

Un point trace une ligne droite dans le ciel. Soudain, le point lumineux tremble, s'élargit, bifurque et se divise encore. Sans qu'on leur dise quoi que ce soit, toutes les personnes qui fixent le ciel savent que quelque chose de terrible vient de se passer.

Le 1^{er} février 2003, la navette spatiale Columbia explose à son entrée dans l'atmosphère. Tous les membres d'équipage périssent sur-le-champ. Dans l'immédiat, la pire des tragédies est très certainement la perte de sept vies. Toutefois, nous avons tous perdu beaucoup plus, car c'est un recul dans un projet auquel toute la race humaine prend part indirectement. Dans le milieu scientifique, nous avons nos propres raisons de marquer un temps d'arrêt pour réfléchir à ce que nous avons perdu. Ce n'est pas aussi évident pour les mathématiciens que pour les spécialistes d'autres domaines scientifiques, mais nous avons tout de même essuyé des pertes.

Il est certain que les mathématiques ne dépendent pas de façon tangible de l'exploration spatiale au même titre que l'astronomie, par exemple. Les observations de télescopes satellites peuvent, peut-être, nous confirmer que la géométrie à grande échelle de notre univers a une courbure positive ou négative, mais les théories appartenant aux géométries sphérique, euclidienne et hyperbolique existent néanmoins. Les mathématiques sont associées à l'étude des cristaux, mais pas tellement aux applications pratiques de leur croissance en apesanteur, et un ensemble vide est plus vide que le vide interstellaire. Nous n'avons pas besoin d'aller dans l'espace pour découvrir les mathématiques.

En fait, il est vrai que notre science requiert très peu de ressources matérielles. On peut faire des mathématiques

dans une cuisine, dans une cellule de prison, sur une nappe en papier dans un café ou dans les marges d'un livre. Ce qui est vital, c'est la capacité d'imaginer, de remettre en question et surtout, de rêver. Pas des rêves transitoires, oubliés dès le réveil, mais des rêves nourris, enrichis et portés à maturité pendant des années parfois. Des rêves qu'il faut rêver d'une certaine façon, parce qu'il y a de bonnes et de mauvaises réponses. Je crois que l'exploration de l'espace stimule, chez l'humain, cette combinaison de rigueur et d'imagination. Qui sait, peut-être, qu'il est possible qu'elle rapproche un peu le genre humain à une façon de comprendre que nous reconnaissons être bonne.

Avant le programme Apollo, personne ne pouvait prédire les répercussions technologiques qui en résulteraient. Aujourd'hui non plus nous ne pouvons pas savoir quels avantages nous apportera l'exploration spatiale dans les années à venir. Mais tout cela n'a rien de nouveau pour nous, qui avons suivi l'évolution de la théorie des nombres pendant des siècles avant qu'elle ne se retrouve— presque par la bande— la hémoglobine du commerce électronique. Qui aurait pu prédire l'application des nombres complexes à l'électronique, de la théorie des catégories à l'organisation des bases de données, ou de l'algèbre abstraite à la physique théorique?

Quand l'être humain tente d'accomplir des exploits glorieux et légèrement utopiques, comme l'exploration spatiale, d'autres personnes apprennent ce que les mathématiciens, entre autres, ont toujours su: qu'un rêve, poursuivi avec patience et discipline, nous amène bien au-delà de la rêverie.

CMS MEETINGS

The most up-to-date information concerning the programmes, including detailed schedules, will be made available at the meeting web site

<http://www.cms.math.ca/Events/summer03>

Meeting registration forms and hotel accommodation forms are also available on the web site, along with online forms for registration and submission of abstracts.

RÉUNIONS DE LA SMC

Vous trouverez l'information la plus récente sur les programmes, y compris les horaires, sur le site Web suivant:

<http://www.cms.math.ca/Reunions/ete03>

Vous trouverez les formulaires d'inscription et de réservation d'hôtel sur notre site Web, tout comme les formulaires électroniques d'inscription et de présentation de résumé.

CALLS FOR NOMINATIONS / APPEL DE CANDIDATURES

2003 Adrien Pouliot Award

Nominations of individuals or teams of individuals who have made significant and sustained contributions to mathematics education in Canada are solicited. Such contributions are to be interpreted in the broadest possible sense and might include: community outreach programmes, the development of a new program in either an academic or industrial setting, publicizing mathematics so as to make mathematics accessible to the general public, developing mathematics displays, establishing and supporting mathematics conferences and competitions for students, etc.

Nominations must be submitted on the "Nomination Form" available from the CMS Office. To assure uniformity in the selection process, please follow the instructions precisely. Documentation exceeding the prescribed limits will not be considered by the Selection Committee.

Individuals who made a nomination in 2002 can renew this nomination by simply indicating their wish to do so by the deadline date. Only materials updating the 2002 Nomination need be provided as the original has been retained.

Nominations must be received by the CMS Office no later April 30, 2003. Please send six copies of each nomination to the address given below.

The Adrien Pouliot Award / le Prix Adrien-pouliot

Canadian Mathematical Society / La Société mathématique du Canada
577 King Edward, Suite 109, P.O. Box 450, Station A / C.P. 450, Succ. A
Ottawa, Ontario K1N 6N5

Prix Adrien-Pouliot 2003

Nous sollicitons la candidature de personnes ou de groupe de personnes ayant contribué de façon importante et soutenue à des activités mathématiques éducatives au Canada. Le terme "contributions" s'emploie ici au sens large; les candidats pourront être associés à une activité de sensibilisation, un nouveau programme adapté au milieu scolaire ou à l'industrie, des activités promotionnelles de vulgarisation des mathématiques, des initiatives, spéciales, des conférences ou des concours à l'intention des étudiants, etc.

Les candidatures doivent nous être transmises via le "Formulaire de mise en candidature" disponible du bureau de la direction de la SMC. Pour garantir l'uniformité du processus de sélection, veuillez suivre les instructions à la lettre. Toute documentation excédant les limites prescrites ne sera pas considérée par le comité de sélection.

Il est possible de renouveler une mise en candidature présentée l'année dernière, pourvu que l'on en manifeste le désir avant la date limite. Dans ce cas, le présentateur n'a qu'à soumettre des documents de mise à jour puisque le dossier original a été conservé.

Les mises en candidature doivent parvenir au bureau de la SMC avant le **30 avril 2003**. Veuillez faire parvenir vos mises en candidature en six exemplaires à l'adresse suivante:

Associate Editors / Rédacteurs associés

The Publications Committee of the CMS solicits nominations for **three Associate Editors for the Canadian Journal of Mathematics (CJM) and the Canadian Mathematical Bulletin (CMB)**. The appointment will be for five years beginning January 1, 2004. The continuing members (with their end of term) are below.

The deadline for the submission of nominations is **April 15, 2003**. Nominations, containing a curriculum vitae and the candidate's agreement to serve should be sent to the address below.

Le comité des publications de la SMC sollicite des mises en candidatures pour **trois postes de rédacteurs associés du Journal canadien de mathématiques (JCM) et Bulletin canadien de mathématiques (BCM)**. Le mandat sera de cinq ans et débutera le 1 janvier 2004. Les membres qui continuent suivent.

L'échéance pour proposer des candidats est **le 15 avril 2003**. Les mises en candidature, accompagnées d'un curriculum vitae ainsi que du consentement du candidat(e), devrait être envoyées à l'adresse ci-dessous.

Continuing members / Les membres qui continuent

CJM Editors-in-Chief / Rédacteurs-en-chef du JCM
Henri Darmon and/et Niky Kamran, McGill (2006)

Rédacteurs-en-chef du BCM / CMB Editors-in-Chief:
James Lewis, Arturo Pianzola; Alberta and/et Noriko Yui; Queen's (2005)

Associate Editors / Rédacteurs associés

M. Barlow, UBC (2004) P. Borwein, SFU (2004)
W. Craig (McMaster) (2007) G. Elliott, Toronto (2005)
A. Geramita, Queen's (2006) V. Kac, MIT (2006)
F. Lalonde, Montréal (2003) J. Millson, Maryland (2003)
R. Murty, Queen's (2006) N. Pippenger, UBC (2004)
F. Shahidi, Purdue (2005) C. Sulem, Toronto (2003)
M. Zworski, California (2006)

Dana Schlomiuk, Chair / Présidente

CMS Publications Committee
Comité des publications de la SMC
Département de mathématiques et de statistique
Université de Montréal, CP-6128 Centre-ville
Montréal, Québec H3C 3J7
chair-pub@cms.math.ca

BISHOP'S UNIVERSITY

Department of Mathematics - Teaching position

The Department of Mathematics, Bishop's University, invites applications for a 10-month appointment, effective July 1, 2003 or by arrangement. Candidates should hold a Ph.D. in Mathematics and demonstrate a strong commitment to undergraduate teaching. Experience teaching calculus for life- sciences and chemistry students is an asset. The successful applicant will teach six courses during the year. The present salary range is \$40,262 - \$50,033 (with Ph.D.).

Sherbrooke, Québec is an affordable city of 140,000 people, with two universities and a teaching/research hospital. Sherbrooke is located in the center of Québec's beautiful Eastern Townships, but is only ninety minutes from Montreal. Bishop's University is nestled in the quiet, bilingual borough of Lennoxville, on an idyllic 500-acre campus, abounding in recreational opportunities.

A curriculum vitae, copies of teaching evaluations (if available) and three letters of recommendation addressing the applicant's teaching ability should be sent to:

Dr. N. Brad Willms, Dean

Division of Natural Sciences and Mathematics

Bishop's University

Sherbrooke, QC J1M 1Z7

Fax (819) 822-9661

Email: bwillms@ubishops.ca

The closing date for applications is **May 1, 2003**. Bishop's University is committed to gender equity in employment. In accordance with Canadian immigration requirements, all qualified candidates are encouraged to apply; however, Canadians and Permanent Residents will be given priority.



POSITION IN MATHEMATICS

UNIVERSITY OF PRINCE EDWARD ISLAND

The Department of Mathematics and Computer Science invites applications for a **10-month sabbatical replacement appointment** in Mathematics at the Assistant Professor level, effective August 15, 2003 or by arrangement. Candidates should hold a Ph.D. in Mathematics and demonstrate a strong commitment to undergraduate teaching.

Applicants must arrange for three (3) letters of reference to be sent directly from referees. The closing date for applications is **March 28, 2003**. The University of Prince Edward Island is committed to gender equity in employment. In accordance with Canadian immigration requirements, all qualified candidates are encouraged to apply; however, Canadians and Permanent Residents will be given priority.

Applications, including curriculum vitae and evidence of teaching ability, should be forwarded to:

Dr. Max Burke, Chair

Department of Mathematics & Computer Science

University of Prince Edward Island

550 University Avenue

Charlottetown, Prince Edward Island

Canada C1A 4P3

Telephone: (902) 566-0508 / Fax: (902) 566-0466

E-mail: burke@upei.ca / Homepage: <http://www.math-cs.upei.ca/>

CALL FOR SESSIONS / PROPOSITIONS DE SÉANCES

CMS/CAIMS Summer meeting June 2004 / Réunion conjointe SMC/SCMAI juin 2004

Additional self-supported sessions play an important role in the success of our meetings. The CMS and CAIMS welcomes and invites proposals for self-supported sessions for this joint meeting (Sunday June 13 -- Tuesday June 15, 2004) at Dalhousie University. Proposals should include a brief description of the focus and purpose of the session, the number and expected length of the talks, as well as the organizer's name, complete address, telephone number, e-mail address, etcetera. These additional sessions will be incorporated with the other sessions in time blocks allocated by the Meeting Directors. All sessions will be advertised in the CMS Notes, in the CAIMS Newsletter, on the web sites and, if possible, in the Notices of the AMS and in publications of other societies. Speakers in these additional sessions will be requested to submit abstracts which will be published in the meeting programme. The following provides information on the sessions confirmed to date.

Those wishing to organize a session should send a proposal to the Meeting Director by the deadline below.



Les séances complémentaires autonomes jouent un rôle important dans le succès de nos Réunions. La SMC et la Société canadienne de mathématiques appliquées et industrielles (SCMAI) vous invitent à proposer des séances autonomes pour son congrès conjoint qui se tiendra à l'Université Dalhousie (du dimanche 13 juin au mardi 15 juin 2004). Toute proposition comprendra une brève description de l'orientation et des objectifs de la séance, le nombre de communications prévues et leur durée ainsi que le nom, l'adresse complète, le numéro de téléphone, le courriel et autres coordonnées de l'organisateur. Ces séances complémentaires seront intégrées aux autres séances au programme, dans des cases horaires prévues à cet effet par les directeurs de la Réunion. Toutes les séances seront annoncées dans les Notes de la SMC, dans le bulletin de la SCMAI, sur les sites Web des deux sociétés et, si possible, dans le bulletin de l'AMS et les publications d'autres sociétés. Les conférenciers de ces séances complémentaires devront présenter un résumé qui sera publié dans le programme de la Réunion. Vous trouverez ci-dessous de l'information sur les séances déjà confirmées.

Toute personne qui souhaiterait organiser une séance est priée de faire parvenir une proposition à l'un des directeurs de la Réunion avant la date limite ci-dessous.

Deadline: September 15, 2003 / Date limite : 15 septembre, 2003

Meeting directors / directeurs de la réunion :

Richard Wood (CMS/SMC) rjwood@mathstat.dal.ca

Patrick Keast (CAIMS/SCMAI) keast@mathstat.dal.ca

CMS Summer Meeting 2004 / Réunion d'été 2004 de la SMC
Department of Mathematics and Statistics - Dalhousie University
Halifax, Nova Scotia, Canada B3H 3J5
Tel: (902) 494 2572 Fax: (902) 494 5130 e-mail: rjwood@mathstat.dal.ca

Organizers / Organismes

Topos Theory (CMS) / Théorie des topos (SMC)

Myles Tierney

Applications of Invariant Theory to Differential Geometry (CMS) / Applications de la théorie des invariants à la géométrie différentielle (SMC)

R. Milson and M. Fels

Hopf Algebras and Related Topics (CMS) / Algèbres de Hopf et sujets connexes (SMC)

Yuri Bahturin

Graph Theory and the Web (CMS/CAIMS) / Théorie des graphes et la Toile (SMC/SCMAI)

J. Janssen

Nonlinear Dynamics in Biology and Medicine (CAIMS) / Dynamique non linéaire en physiologie et en médecine (SCMAI)

Shigui Ruan

Fluid Dynamics (CAIMS) / Dynamique des fluides (SCMAI)

Serpil Kocabiyik

Numerical Algorithms for Differential Equations and Dynamical Systems (CAIMS) / Algorithmes numériques pour les équations différentielles et les systèmes dynamiques

Tony Humphries



ICIAM 2003
5th International Congress
on Industrial and
Applied Mathematics
SYDNEY, AUSTRALIA
7-11 JULY 2003



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 Fax: (+61 2) 9251 3552
iciam@icmsaust.com.au

ICIAM



CALENDAR OF EVENTS / CALENDRIER DES ÉVÉNEMENTS

APRIL 2003 / AVRIL

March 31 - 4 ICMS Workshop: SDEs and SPDEs, Numerical Methods and Applications (International Centre for Mathematical Sciences, Edinburgh)
www.ma.hw.ac.uk/icms/meetings/2003/sde/index.html

26 - 27 Pacific Northwest Geometry Seminar (UBC, Vancouver)
www.math.washington.edu/~lee/PNGS/

MAY 2003 / MAI

5 - 9 Theorie des Nombres et Applications (Université Hassan II of Casablanca and Université de Marrakech, Morocco)
elmorchid@yahoo.fr, cl@mat.ulaval.ca

11 - 16 International Conference on General Control Problems and Applications (GCP2003) : Dedicated to the 100th anniversary of A. N. Kolmogorov (Tambov State University, Tambov, Russia)
www.opu2003.narod.ru/

14 - 18 Complex Systems and Computer Science in Sport (Barcelona)
 Natàlia Balagué: www-ma1.upc.es/comcom/

16 - 18 Canadian School Mathematics Forum 2003 / Forum canadien sur l'enseignement des mathématiques 2003 (Montréal, Québec)
www.cms.math.ca/Events/CSMF2003/
www.smc.math.ca/Reunions/FCFM2003/

17 - 22 Sixth Graduate Math Modelling Camp (BIRS, Banff)
www.pims.math.ca/industrial/2003/gimmc.

21 - 23 31st Canadian Annual Symposium on Operator Algebras and Operator Theory (UNB, Fredericton)
www.math.unb.ca/~coas2003

24 - 30 Conference in Number Theory in Honour of Professor H.C. Williams (Banff, Alberta)
www.fields.utoronto.ca/programs/scientific/02-03/numtheory/

24 - 29 Seventh Industrial Problem Solving Workshop (University of Calgary)
www.pims.math.ca/industrial/2003/ipsw

30 - June 1 Groups and Semigroups in Analysis, Conference in honor of J.S. Pym (University of Sheffield, U.K.)
www.math.uwo.ca/~milnes/JSMay03.htm

30 - June 1 Annual Meeting of the Canadian Society for History and Philosophy of Mathematics; Special Session: Maritime Mathematics (Dalhousie University, Halifax)
www.cshpm.org ; baltus@oswego.edu

JUNE 2003 / JUIN

8 - 15 41st International Symposium on Functional Equations (Noszvaj, Hungary)
pales@math.klte.hu ; <http://riesz.math.klte.hu/~isfe>

14 - 16 CMS Summer Meeting / Réunion d'été de la SMC (University of Alberta, Edmonton, Alberta)
www.cms.math.ca/Events/ ; www.smc.math.ca/Reunions/

17 - 21 Fourth Butler Memorial Conference (University of Alberta, Edmonton, Alberta, Canada)
<http://conley.math.ualberta.ca/butler.html>

18 - 21 First Joint Meeting between AMS and Real Sociedad Matematica Espanola – (Seville, Spain)
www.us.es/rsme/-ams/

23 - 25 SIAM Conference on Mathematics for Industry: Challenges and Frontiers (The Metropolitan Hotel, Toronto, ON)
meetings@siam.org

29 - July 3 Conference in honour of Alexander Arhangel'skii (Brooklyn College of CUNY, Brooklyn, NY)
www.sci.brooklyn.cuny.edu/~raushan/Conferende

JULY 2003 / JUILLET

1 - 10 Advanced Course on Polynomial Identity Rings (Bellaterra, Barcelona, Spain)
 Ferran Cedó: www.crm.es/PI-rings

7 - 11 Fifth International Congress in Industrial and Applied Mathematics (Sydney, Australia)
www.iciam.org

7 - 18 Structural Theory of Automata, Semigroups, and Universal Algebra Conference (Université de Montréal)
www.dms.umontreal.ca/sms

7 - 19 44th International Mathematical Olympiad / 44e Olympiade internationale mathématique

(Tokyo, Japan)
<http://olympiads.win.tue.nl/imo/>

21 - August 15 Second Annual AARMS
 Summer School for Graduate Students
 (St. John's, Newfoundland)
www.math.mun.ca/aarms/summerschools

27 - August 9 Banach algebras and their applications
 (University of Alberta, Edmonton, AB)
www.math.ualberta.ca/ba03/

AUGUST2003AOÛT

4 - 9 International Algebraic Conference
 (Lviv, Ukraine)
topos@franko.lviv.ua

5 - 8 12th International Workshop on Matrices
 and Statistics (IWMS 2003)
 (Dortmund, Germany)
www.statistik.uni-dortmund.de/IWMS/main.htm

11 - 13 15th Canadian Conference on
 Computational Geometry
 (Dalhousie University, Halifax, NS)

SEPTEMBER2003SEPTEMBRE

2 - 6 Barcelona Conference on Asymptotic Statistics
 (Bellaterra, Barcelona, Spain)
Vladimir Zaiats: www.crm.es/bas2003

16 - 20 Barcelona Conference on Set Theory, Bellaterra
 (Barcelona, Spain)
Joan Bagaria: www.crm.es/set-theory

30 - October 7 Mathematics in Armenia - advances
 and perspectives (Institute of Mathematics of NAS
 of Armenia, Yerevan, Armenia)
<http://math.sci.am/conf.htm>

DECEMBER2003DÉCEMBRE

6 - 8 CMS Winter Meeting / Réunion d'hiver de la SMC
 Simon Fraser University
 (Harbour Centre, Vancouver, British Columbia)
Monique Bouchard: meetings@cms.math.ca

15 - 19 28th Australasian Conference on Combinatorial
 Mathematics and Combinatorial Computing
 (Melbourne, Australia)
www.cm.deakin.edu.au/comb2003melbourne

JANUARY2004JANVIER

21 - 30 Advanced Course on Ramsey Methods in Analysis
 (Bellaterra, Barcelona, Spain)
Joan Bagaria: www.crm.es/RamseyMethods

FEBRUARY2004FÉVRIER

2 - 13 Advanced Course on Contemporary Cryptology
 (Bellaterra, Barcelona, Spain)
Paz Morillo: www.crm.es/ContemporaryCryptology

JUNE2004JUN

Mathematical Foundations of Learning Theory
 (Barcelona, Spain)
Gábor Lugosi: www.crm.es/MathematicalFoundations

4 - 11 The 10th International Congress
 on Mathematical Education
 (Copenhagen, Denmark)
www.ICME-10.dk

13 - 15 CMS Summer Meeting / Réunion d'été de la SMC
 (Dalhousie University, Halifax, Nova Scotia)
Monique Bouchard: meetings@cms.math.ca

27 - July 2 European Congress of Mathematics
 (Stockholm, Sweden)
Ari Laptev: laptev@math.kth.se

JULY2004JUILLET

5 - 16 Advanced Course on Automata Groups
 (Bellaterra, Barcelona, Spain)
Warren Dicks: www.crm.es/AutomataGroups

**12 - 15 First Joint Canada-France meeting of the
 mathematical sciences / Premier congrès Canada-
 France des sciences mathématiques**, (Toulouse, France)
www.cms.math.ca/Events/Toulouse2004/
www.smc.math.ca/Reunions/Toulouse2004/

DECEMBER2004DÉCEMBRE

**11 - 13 CMS Winter Meeting / Réunion d'hiver
 de la SMC**, (McGill University, Montréal, Québec)
Monique Bouchard: meetings@cms.math.ca

The 2003 Membership

Notices have been mailed. Please renew your membership now. To renew electronically, please visit our website at www.cms.math.ca.

Adhésion à la SMC

Les avis d'adhésion 2003 ont été postés. Veuillez renouveler votre adhésion maintenant. Vous pouvez aussi renouveler au site web www.smc.math.ca.

RATES AND DEADLINES 2003 / TARIFS ET ÉCHÉANCES 2003

Net rates / Tarifs nets	Institutional Members Membres institutionnels	Corporate Members Membres organisationnels	Others Autres
Full page	\$235	\$440	\$585
3/4 page	\$ 215	\$400	\$535
1/2 page	\$145	\$265	\$355
1/4 page	\$85	\$160	\$215
Inserts: max. 4 pages	\$185	\$345	\$460
Surcharges apply for prime locations - contact notes-ads@cms.math.ca Des suppléments sont applicables pour des places de choix - communiquer avec notes-ads@smc.math.ca			

Issue/Numéro	Deadline/Date limite
February/février	December 1 décembre
March/mars	January 15 janvier
April/avril	February 15 février
May/mai	March 15 mars
September/septembre	July 1 juillet
October/octobre	August 15 août
November/novembre	September 15 septembre
December/décembre	October 15 octobre
Maximum page size / taille maximum des pages: Back page/4e de couverture: 7.5 x 8.5 in/pouces Inside page/page intérieure: 7.5 x 10 in/pouces	

The CMS Notes is mailed in the first week of the issue month. Subscription to the Notes is included with the CMS membership. For non-CMS members, the subscription rate is \$45 (CDN) for subscribers with Canadian addresses and \$45 (US) for subscribers with non-Canadian addresses.

Les Notes de la SMC sont postées la première semaine du mois de parution. L'adhésion à la SMC comprend l'abonnement aux Notes de la SMC. Le tarif d'abonnement pour les non-membres est de 45 \$ CAN si l'adresse de l'abonné est au Canada et de 45 \$ US autrement.