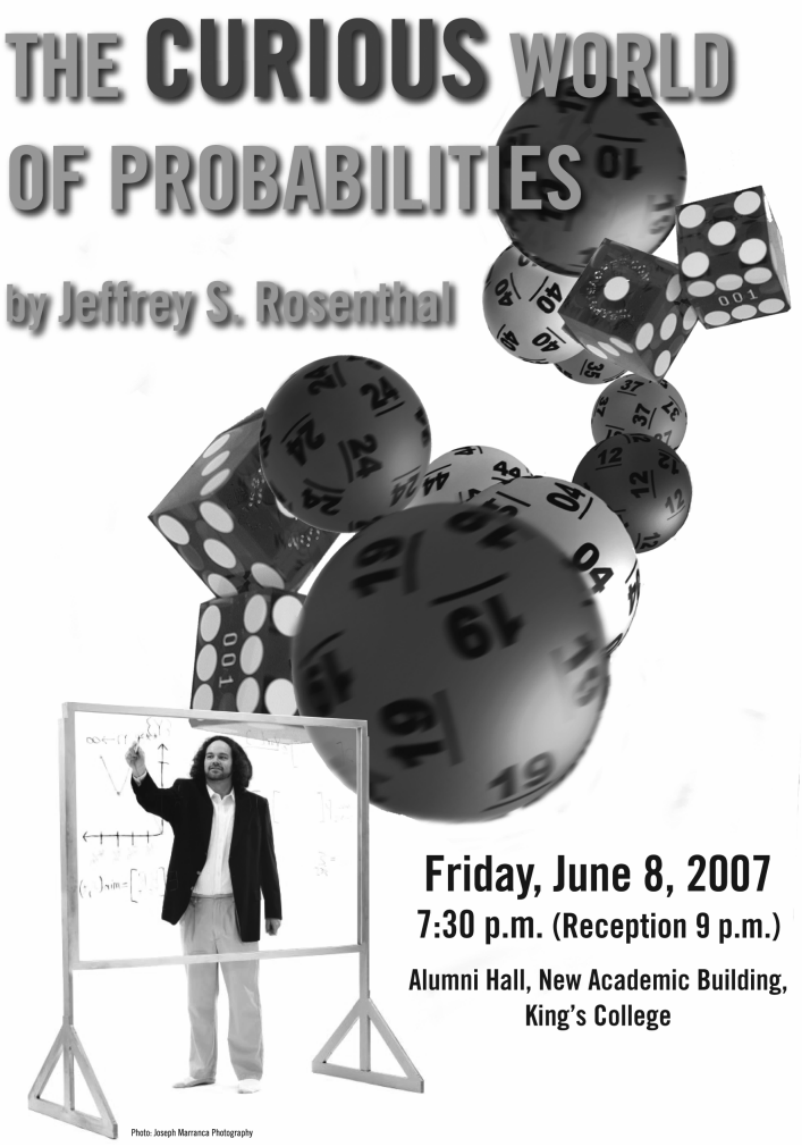
Dalhousie University
Inspiring Minds

CHASE REPORT

NEWSLETTER OF THE DEPARTMENT OF MATHEMATICS AND STATISTICS

Faculty of Science **MAY 2007**



Alumni Hall, New Academic Building, King's College

CONGRATULATIONS

AWARDS WINNERS

Sir William Young Gold Medal in Mathematics
Theresa R. Mader

University Medal in Statistics
Jillian Falkenberg

Ralph & Frances Lewis Jeffery Scholarship
Theresa R. Mader

Barry Ward Fawcett Memorial Prize
Misha M. Denil

Ken Dunn Memorial Prize
Carol J. Ross

Katherine M. Buttenshaw Prize
Marc-André Chavy-Macdonald

Waverly Prize
Graham H. Carey

Emil and Stella Blum Award in Mathematics
Peter D. Crooks

Ellen McCaughin McFarlane Prize
Peter D. Crooks

Lorne O. L. Titus Award
Theresa R. Mader

Department of Mathematics & Statistics Bursary
Jillian M. Falkenberg

Professor Michael Edelstein Memorial Graduate Prize
Andrew H. Hoefel

NSERC AWARD WINNERS

PGS-M	*Jill Falkenberg* *Sonja Pritchett*
PGS-D2	*Karyn McLellan* *Margaret-Ellen Messinger* *Angela Siegel*
PGS-D3	*Meghan Allen* *Neil McKay* *Robert Noble*
CGS-M	*Theresa Mader*
USRA	*Nathan Singer*
KILLAM	*Andrew Hoefel* *Meghan Allen* *Neil McKay*

HONOURS STUDENTS

Honours - Mathematics

Theresa R. Mader	First Class Honours Math
Lindy DeCoste	Honours Math
Michelle Bilocq	Honours Math, Stat
James Park	Honours Math
Harry Xu	Honours Math, Econ
Anne Loosen	First Class Honours Math
Layal Al-Rustom	Contemporary Studies, Math
Kathleen Aline Mayo Graham	Co-operative Programme with Honours in Earth Sciences and Mathematics

Honours - Statistics

Jillian M. Falkenberg	First Class Honours Stat, Math

GRADUATE STUDENTS

October 2006 Convocation:

Mathematics	Statistics
Meghan Allen, MSc	*Melanie Abeysundera*, MSc
Katie Gardner, MSc	*Kin Hung Chan*, MSc
Joey Latta, MSc	*Sipi Garg*, MSc
Steven Noble, MSc	*Leah Gerber*, MSc
Fraser Stewart, MSc	*Wenyi Jiang*, MSc
Changping Wang, PhD	*Li Li*, MSc
Rebecca White, MSc	*Laura MacKenzie*, MSc
	Xiaofei Shi, PhD

May 2007 Convocation:

Mathematics	Statistics
Timothy Caley, MSc	*Paul Sheridan*, MSc
Rania Ghanam, MSc	
Andrew Hoefel, MSc	
Garrett MacLean, MSc	
Mehrangiz Naghibi, MSc	
Heulwen Rankin, MSc	

MESSAGE FROM THE CHAIR

by Dr. Karl Dilcher

For almost a year now I've had the honour and the privilege of being the chair of this department. I can only echo the sentiment expressed by my predecessor Dr. Patrick Keast in last year's Chase Report: Time flies when you're having fun.

Pat Keast's 3-year tenure as chair marked a period of rapid change, with numerous retirements and some resignations, and with just as many excellent new appointments. Such times of change often bring with them the danger of turbulences and uncertainties, but under Pat's capable leadership this beginning transition in the department's demographics went very smoothly, and this is still the friendly place it has always been.

Compared with those three years, this past year has been relatively quiet, and I am beginning to benefit from the excellent new appointments made under Pat's leadership. By all accounts, our new colleagues are first-rate researchers, excellent teachers, and they are already pulling their weight in the governance of the department. The future of the department is in good hands indeed. Let me mention them by name: Drs. Michael Dowd, Sara Faridi, Joanna Flemming, David Iron, Theodore Kolokolnikov, Peter Selinger, and Roman Smirnov. Mike and Joanna are Statisticians, the other five colleagues are Mathematicians.

Another two valued colleagues will retire on June 30, 2006, namely Drs. R.P. Gupta (Statistics) and Patrick Keast (Mathematics). Both were past chairs, with R.P. (1991-98) the longest-serving chair in recent decades; please see the notes of appreciation below.

While no new appointments are on the horizon for the next few years, we have been blessed with a particularly strong and active group of postdoctoral fellows; see below for their names. Let me just mention that this department continues to be very successful in the Killam Postdoctoral Fellow competition, with the latest Killam PDF, Dr. Georgios Papadopoulos, to arrive this Summer.

Some other highlights of this year have been the awarding of tenure to Drs. Andrea Fraser (Mathematics) and Hong Gu (Statistics), and the reappointment of Dr. David Iron (Mathematics). It was a particular pleasure for me to be informed that Paula Flemming from our Department Office was awarded one of this year's Rosemary Gill Awards, and that Dr. Tony Thompson was appointed Professor Emeritus. These are well-deserved honours for two of the longest-serving and most valued members of the department.

There are many more things to be reported this year, all can be found in the following pages. Enjoy reading this new issue of the Chase Report.

THE CHASE FAMILY

Students, staff, and faculty in the Chase Building do, of course, form one big happy (well, mostly happy) family. But this past year we can report more family news, in the original meaning, than perhaps ever before.

Our graduate students **Geoff Cruttwell** and **Meghan Allen** married (each other) in June, 2006, in Belize.

Theodore Kolokolnikov was married to Shannon Peng in 2006, and word has it that they got married twice, the second time in Hong Kong in December.

The wedding of **Pierre Stevens** and Elizabeth (Mandy) Kay Raining-Bird was solemnized by S. Swaminathan on August 11th, 2006.

Our graduate students **Sable McKeil** and **Garrett MacLean** were married in October, 2006, in the University Club here on campus.

Roman Smirnov was married to Ekaterina Akudovich, also by S. Swaminathan, on December 7th, 2006.

Balagopal Pillai got married on January 29th, 2007, in India. A reception was held for him and his wife Uma in his hometown on January 31st.

Richard Hoshino, a Ph.D. student who has already left campus, will get married to Karen Storey on June 16th, 2007, in Halifax.

A baby boy, Sebastian Yi-An Kolokolnikov, was born to **Theodore Kolokolnikov** and his wife Shannon on July 22nd, 2006.

Another baby boy, Benjamin William (Ben) was born

to **Joanna** and Scott **Flemming** on November 23rd, 2006.

And, word has it that at least four more babies are on their way! (It appears that mathematicians and statisticians know how to multiply). *-kd*

ALUMNI, FACULTY AND GRADUATE STUDENTS NEWS

Dr. C.C.A. Sastri was appointed Adjunct Professor, July 1, 2006 for a 5 year term.

Vaneeta Grover was invited to make a guest presentation *Variables affecting the success of implementation* for *Program and Policy Implementation* at York University for graduate students in the Faculty of Environmental Studies (Feb 9 2007).

She also attended the Second Annual Canadian Genetic Epidemiology and Statistical Genetics Meeting at the Field's Institute on April 15-17, 2007, in Toronto.

Vaneeta Grover, Dr. D. E. C. Cole and **Dr. D. C. Hamilton** attended the Second Annual Canadian Genetic Epidemeology and Statistical Genetics Meeting at the Fields Institute, also presented a poster: *Hardy-Weinberg Disequilibrium (HWD) analysis in candidate gene association studies of heterogeneous disorders: Solving the problem of the multiplicative model*.

Vaneeta Grover has been awarded a tuition scholarship for 3 modules at the 2007 Summer Institute in Statistical Genetics at the University of Washington to be held this summer from June 11 - 29. She gave two sessions of the Math Circles on *Probability and Statistics*.

Dr. Roman Smirnov has been elected as a Director of the Canadian Mathematical Society.

Jeannette Janssen and **Pawel Pralat** are organizing the fourth workshop on Combinatorial and Algorithmic Aspects of Networks, which will be held in the Chase building on August 14, 2007.

Jeannette Janssen was a co-organizer of the fifth workshop on *Algorithms and Models for the Web Graph* (WAW 2007), which was held at the Banff International Research Station on November 30-Dec.1, 2007. The workshop was preceded by a Winter School on Modelling and Mining of Networked Information Spaces (same organizers) which was attended by several graduate students from Dalhousie. Jeannette Janssen is a guest editor of a special issue of the journal *Internet Mathematics* dedicated to selected papers from WAW 2007.

Pierre Stevens was appointed to serve on the Dalhousie Faculty Association's negotiating team for the current contract negotiations.

POSTDOCTORAL FELLOWS

Our department has always enjoyed the energy, youthfulness, and additional research strength brought by postdoctoral fellows. This past year we were particularly fortunate to have perhaps more postdoctoral fellows than ever before, and most of them will stay on for at least another year.

Dr. Johan Brannlund received his Ph.D. at Stockholm University in 2003, after which he was a postdoctoral fellow at UBC. He came to Dalhousie in November, 2006, and has been working with Dr. Alan Coley. He will remain with us for at least the next year.

Dr. O-Yeat Chan received his Ph.D. at the University of Illinois in 2006, just before coming to Dalhousie. His fields of interest are classical, additive, and computational Number Theory, and he works with Drs. Jonathan Borwein and Karl Dilcher. Dr. Chan was recently awarded an NSERC postdoctoral fellowship for the next two years.

Dr. Kia Dalili received his Ph.D. at Rutgers University in 2005, and shortly afterwards came to Dalhousie to work with Dr. Sara Faridi. His research interests are Commutative Algebra and Algebraic Geometry. He has been awarded a three-year PDF at the University of Missouri in Columbia, beginning this Fall.

Dr. Sigbjørn Hervik received his Ph.D. at Cambridge University in 2004, after which he came to Dalhousie as a Killam Postdoctoral Fellow. This past year he has been an AARMS PDF, and he will remain at Dalhousie for at least another year. His fields of interest are

General Relativity and Cosmology, and he has been working with Dr. Alan Coley.

Dr. Georg Hofmann has been with us as a sessional instructor for the past two years. This coming year he will also hold a partial PDF, working with Dr. Keith Taylor. He received his Ph.D. at Darmstadt, Germany, in 2004; his research interests include infinite-dimensional Lie algebras and the geometry of reflection groups.

Dr. Toby Kenney received his Ph.D. at Cambridge University in 2006, and came to Dalhousie in September of that year as an AARMS postdoctoral fellow. His research interests are in Category Theory and Topos Theory, and he has been working with Drs. Bob Paré and Richard Wood.

Dr. Dante Manna received his Ph.D. at Tulane University in 2006, and joined this department soon afterwards on an AARMS Director's Postdoctoral Fellowship. His fields of interest are Classical Analysis and Number Theory, and he works with Drs. Jonathan Borwein and Karl Dilcher.

Dr. Nicos Pelavas received his Ph.D. at Queen's University in 2002, and he has been in this department since the Fall of that year as a postdoctoral fellow and instructor of numerous courses. His fields of interest are General Relativity and Cosmology, and he works with Dr. Alan Coley.

Dr. Pawel Pralat received his Ph.D. at Adam Mickiewicz University in Poznań, Poland, in 2004, after which he was a postdoctoral fellow at the University of Waterloo and Wilfrid Laurier University. Since September, 2006, he has been a PDF in this department, partly funded through MITACS. His research area is Modelling and Mining of Network Information Systems, and he has been working with Dr. Jeannette Janssen.

Dr. Huaichun Wang, who has been at Dalhousie since December, 2004, received his Ph.D. in Biology at the University of Ottawa in 2005. His research interests include Molecular Evolution and Bioinformatics, and he has worked with Dr. Ed Susko and his co-investigators on statistical modelling of protein sequence evolution.

Last, but not least, our new Killam Postdoctoral Fellow, to arrive later this Summer, is **Dr. Georgios Papadopoulos**. He received his Ph.D. at the University of Athens in 2005 and has been a postdoctoral fellow there since that time. His field of interest is General Relativity, and in particular Mathematical and Quantum Cosmology. He will be working with Dr. Alan Coley. *-kd*

AWARDS DAY SPEAKER

Dr. Patrick Lett received a B.Sc. in Biology and Mathematics from the University of Guelph, and subsequently a Ph.D. in Biology here at Dalhousie in 1979. At the May 1992, convocation Dr. Lett was awarded an honorary doctorate from Dalhousie.

He set up the Patrick F. Lett Graduate Students Assistance Bursary in 1992 as a safety net for graduate students in Biology who for one reason or another got into financial trouble during the course of their research. Recently, he has extended this bursary to include graduate students in Mathematics and Statistics. Dr. Lett has had a varied career in Biology, Finance, and Applied Mathematics.

Dr. Lett will address students, parents, and faculty at the Awards Day ceremonies on May 28, 2007. *-kd*

AN HONORARY DOCTORATE

Erik Demaine is possibly the youngest graduate ever of our department. In 1995, when the department still contained the Division of Computing Science, he graduated at age 14 with an Honours B.Sc. in Computing Science. He subsequently received his Ph.D. at the University of Waterloo, and at age 21 became the youngest professor at MIT.

Erik is now Associate Professor and Esther and Harold E. Edgerton Professor in Computer Science at MIT. His research interests range throughout algorithms, from data structures for improving web searches, to the geometry of understanding how proteins fold, to the computational difficulty of playing games. In 2003 he received a MacArthur Fellowship.

Erik just completed a book together with Joseph O'Rourke, called "Geometric Folding Algorithms: Linkages, Origami, and Polyhedra", to be published this Summer by Cambridge University Press. He has also coedited "Tribute to a Mathemagician" (A K Peters, 2003), in honor of the influential mathemagician Martin Gardner.

In recognition of his numerous important achievements, Erik Demaine received an honourary doctorate from Dalhousie on May 23. He also gave a colloquium talk in our department on May 22. *-kd*

ROSEMARY GILL AWARD

Paula Flemming of the Department Office was awarded one of this year's Rosemary Gill Awards. These awards are presented annually to a member or members of faculty or staff of the University "who have provided outstanding service, other than teaching, to students".

Paula has been serving this department since July 1, 1972. She has been our Graduate Secretary for many years, and as such she is the main contact person for all our graduate students. She also looks after many financial matters, including TA payments, and the assignment and payment of graders. Paula goes out of her way to assist students with any questions or problems. But not only does she help students, she is genuinely concerned about them, and contributes to the positive atmosphere in our department.

Congratulations to Paula on this well-deserved recognition. *-kd*

HARD TO BELIEVE ...

At the banquet during the CMS Winter Meeting in Toronto in December 2006, Professor S. Swaminathan (Swami) received special recognition on the occasion of his 80th birthday in August 2006. He was also being recognised for his substantial services to the CMS over several decades, including, at present, technical editor for the CMS journals, editor of the CMS Notes, and organizer of a special session at that conference. Among other things, Swami received a framed certificate of recognition, and a bottle of "CMS" wine. Both the Dean of Science, Keith Taylor, and the department chair were present to extend the faculty's and the department's congratulations and thanks to Swami. *-kd*

REPORT FROM THE DIRECTOR OF MATHEMATICS

by Dr. Jeannette Janssen

This has been another vibrant year for the Mathematics division. The presence of many new faculty members is making itself felt in an enrichment of our course offerings. New third year elective courses are being created: two were offered last year, and two more were just approved for next year. Most new faculty members have also developed and taught new advanced undergraduate and graduate courses in their research area.

The first year options for Calculus have also expanded. A new course in Calculus for the Life Sciences was offered for the first time last year, and received good enrollment in spite of an unpopular time slot. Next year, first year students thinking about Honours studies in Mathematics or a theoretical Science subject will be encouraged to enrol in an Honours Calculus course.

This year and last we have had a record number of post-doctoral fellows in the division, while our number of graduate students is increasing steadily. It is great to have so many young people and fresh ideas in the division – we can look forward to a dynamic future.

NSERC GRANTS

Our department continues to be successful in NSERC grant competitions, with almost all full-time faculty members holding Discovery Grants. The following were awarded new or continuing grants:

Michael Dowd	$ 14,000
Chris Field	$ 30,000
Jeannette Janssen	$ 22,000
Pat Keast	$ 16,000
Theodore Kolokolnikov	$ 17,000 (First-time grant)
Bob Paré	$ 10,000

(Amounts are per year, for five years). Furthermore, an

Equipment Grant of $33,500 was awarded to David Iron and several co-applicants; this grant is for further upgrades of the Department's computing infrastructure. Congratulations to all. *-kd*

RETIREMENTS

After decades of service to the Department of Mathematics and Statistics and to Dalhousie University, two colleagues will be officially retiring as of June 30, 2007.

Dr. R.P. Gupta received his B.Sc. in Physics, Mathematics, and Statistics in 1960 at Agra University, followed by an M.Sc. in Statistics in 1962 at the same University, and a Ph.D. in Statistics in 1965 at Delhi University. He held research and postdoctoral positions at Delhi University, before he became an Assistant Professor at the University of Florida in 1966. In 1968 Dr. Gupta came to Dalhousie; he is therefore the longest-serving active faculty member at this time in our department. In 1980 he was promoted to Full Professor. Dr. Gupta's most important contribution to this Department was his service as Chair from 1991-1998, a period that saw the at times difficult amalgamation between Dalhousie and TUNS, and related to that the departure of the Computing Science Division from this Department. Dr. Gupta plans to continue teaching for us in the foreseeable future.

Dr. Patrick Keast received his B.Sc. in Mathematics in 1964 at the University of Edinburgh, and his Ph.D. in Numerical Analysis in 1967 at the University of St. Andrews. From 1964 to 1970 he held positions as Assistant Lecturer and Lecturer at St. Andrews. Dr. Keast first came to Canada as a Visiting Assistant Professor at the University of Toronto in 1968/69, and in 1970 he joined the Physical Sciences Division of Scarborough College at U of T as Assistant Professor. In 1983 he came to Dalhousie as Full Professor. He taught both Mathematics and Computer Science courses, and since the separation of Computing Science from this Department he has served as an important bridge between the two units. Dr. Keast served as Department Chair from 1993 to 1996, a time that saw a relatively large number of retirements and new appointments. In the immediate future, Dr. Keast will lead the AARMS Summer School through its third year at Dalhousie, and will continue to look after a large conference, to take place in early November.

Both Dr. Gupta and Dr. Keast have actively and efficiently contributed to all aspects of their profession, including teaching, graduate supervision, research, and administration. The Department looks forward to having them as colleagues for many more years to come. *-kd*

A FULL-SERVICE DEPARTMENT

Which department can boast its own licensed wedding officer? The reader will already have noticed above that two weddings this past year were officiated by Prof. S. Swaminathan, known as Swami to all. Swami is a valued member of the local Indian and Hindu communities and serves as Priest in the Hindu Temple on Cork Street. He is also much in demand throughout the province for performing weddings, and everybody who knows Swami will know why.

One of Swami's weddings took place in a small but moving ceremony in our Conference Room, which had been nicely decorated for this purpose by Gretchen and Paula. It is reported that just before the vows were exchanged, a puzzled faculty member stuck his head into the room, asking, "what's going on here?". He was immediately asked to join the wedding party by the happy couple, and there was even a glass of, uhum, water left for him.

The chair was shocked, shocked, to hear persistent rumors that champagne was served at the event, and takes this opportunity to express a vigorous denial. *-kd*

MATHEMATICAL MARATHON MEN

What are the odds that from a group of the size of our Math and Stats faculty, one member can boast a child as a participant in the Boston Marathon? Now, how about TWO in the same event?

Well, among the over 20,000 participants of this year's Boston Marathon on April 16 there were Liam Keast (3:42:04, finish position 8455) and Alan Thompson (3:33:23, finish position 6342). Tony Thompson actually went to see Alan run in this, his second Boston

Marathon. After his return Tony is reported to have stuck his head into Pat Keast's office, pronouncing "My son is better than your son!". There are no reports on whether "nya-nya" was also being uttered.

As if this double success wasn't enough: The second fastest Canadian, Rami Bardeesy (2:33:18, finish position 68) is a Dalhousie alumnus (Biology in the early 90's) who also took courses in this department.

Congratulations to Alan, Liam, and Rami on their successes. *-kd*

THE PROFESSOR MICHAEL EDELSTEIN MEMORIAL GRADUATE PRIZE

This new prize will be awarded annually to a graduate student who shows great promise in the mathematical sciences. In order to encourage mathematical talent in both genders, the prize will alternate between male and female recipients. The first award is being made at this year's Awards Day ceremonies.

This prize has been made possible through a generous donation by the Keshet family of Vancouver. Dr. Leah Keshet, a Dalhousie graduate and professor in the Mathematics Department of UBC, is the daughter of the late Professor Edelstein. Michael Edelstein was born in 1917, and he joined Dalhousie in 1964. He was instrumental in the transformation of this department to the research department it is now, with a strong graduate component. Under his influence the Ph.D. programme was established in 1966, and the first Ph.D. in this department graduated in 1969 under his supervision.

After his retirement in 1982 Michael Edelstein held a professorship at Mount Allison University for two years, after which he returned to Halifax. In the mid-1990s he moved to British Columbia, and he passed away in Vancouver on Jan. 27, 2003.

Since Michael Edelstein was so instrumental in establishing a strong research and graduate department, it is only fitting that the first graduate prize in this department be named after him.

The inaugural Edelstein Prize is being awarded to Mr. Andrew Hoefel, who has finished his M.Sc. degree, and has begun working on his Ph.D., both under the supervision of Dr. Sara Faridi. *-kd*

THE LETT BURSARIES

A very substantial gift by a Dalhousie alumnus, Dr. Patrick Lett of Toronto, will make it possible to award several bursaries annually to graduate students who would otherwise have financial difficulties.

The Lett Bursaries will be awarded on the basis of need, and not on academic performance. The principal purpose of this program is to relieve graduate students of financial stress or worries at a time when they should concentrate on finishing their theses. A typical situation would be the second year of an M.Sc. program or an upper year in a Ph.D. program when normal funding has run out. Special circumstances and other unforeseen situations of need will also be considered.

The Lett bursaries will typically be awarded three times a year, to cover the two regular terms and the Summer months. The recipients of the first two bursaries, for

the Summer of 2007, have recently been selected by the appropriate committee. *-kd*

THE VALUE OF ASSIGNMENTS

Every instructor knows the value of assignments to teaching and learning. But now we also know an assignment's monetary value: $30.00 in United States funds.

This past Winter the instructor of one of our courses received a tip-off from an honest soul out in cyber-space. There was clear evidence that an assignment from his course was being circulated in an "Expert Advice" website, with the offer of US$30.00 for a complete solution. In spite of our best efforts, the prospective buyer was never positively identified. Meanwhile, issues of this kind are being taken extremely seriously at all levels of the University Administration. *-kd*

LIBRARY NEWS

While more and more scientific journals become available electronically, and electronic access has now become the norm, books remain as important as ever.

For many years now we have supplemented the regular library budget by an independent fund, the income of which was provided by regular book sales. Through the generosity of retired faculty members and other faculty, alumni, and graduate students we now have a growing collection of high-quality upper-level textbooks and research monographs for sale. They are books of which we already have copies in the library:

http://www.mathstat.dal.ca/~dilcher/oldbooks.html

They are offered for sale on a permanent basis, and the standard price for all members, students, alumni, or friends of the department is $10 for a hardcover, $5 for a paperback, and less for very small or worn-out books. Our aim is to find good homes for these volumes, while getting more funds for purchasing new books. Of course, further donations of any mathematics, statistics, or related books of any kind or vintage are always welcome. *-kd*

A PROOF IS A PROOF

A proof is a proof.
What kind of a proof?
It's a proof.
A proof is a proof.
And when you have
A good proof,
It's because it's proven.

- Jean Chrétien

LEARNING CENTRES

by Pierre Stevens

The Mathematics and Statistics Learning centre is an undergraduate support centre primarily for students who are taking first and second year courses offered by our department. However, the services offered by the Centre are broader and affect four different groups:

- Students
- Departmental faculty
- University community
- The Mathematical Education community at large

Student services

One of the resources available to first and second year students are the Mathematics and Statistics Learning Centres. During the week days, the center is located in Room 009 in the Chase building (Monday-Friday 8.30 am- 5.00 pm.) In the evening (Monday to Thursday 7.00-10.00 pm), the center operates out of Room G40M (the annex) in the Learning Commons in the Killam library. During these hours the Learning Centre primarily functions as a drop-in, first come, first served tutorial service.

The staff for these tutorials consists of the director and Teaching Assistants (TA's). In the course of the day, staff changes at regular intervals. The Learning Centre TA's are comprised of graduate (PhD and MSc) students and honors graduate students.

This year we have enjoyed the valuable services of Sylvia Church, Andrew Hoefel, Harry Xu, Stuart

Crosby, Travis Squires, Rebecca White, Neil McKay, Alex MacLeod, Matt Lewis, Liwen Zou, Jill Falkenberg, Lily Ma, Mei Chen, Scott Wile, Goldis Radjabalipour, Caroline Urquhart, Vaneeta Grover, and Jihua Wu.

The Centre provides an additional service by coordinating hourly course related group tutorial services for Math 1000 and Math 1010. This year Rob Noble was the main coordinator of this service, assisted by the experienced group of Alex Hoefel, Geoff Crutwell and Margaret-Ellen Messinger

Other student services include the display of assignments, their solutions and other relevant resources. In addition the Director provides diagnostic testing services and informally advises students with regard to course selections based on their Mathematical and Statistical skills.

Departmental Faculty

The Centre provides a departmental service by coordinating the timely posting of relevant course materials in collaboration with the different course coordinators and by the creation of appropriate distribution procedures course materials to students. These materials include assignments, solutions, midterms, practice exams, old exams, textbooks, solution manuals, reference manuals, etc.

Informal student advising with regard to appropriate course selection is another resource benefiting the departmental faculty.

University Community

University oriented services include the administration of diagnostic testing as requested by students or as required by department or Registrar's Office.

In addition the director may advise the College of Continuing Education regarding the delivery of remedial mathematics programs.

The Mathematical Education community at large

Part of the director's mandate includes a professional responsibility towards the enhancement of Mathematical Educational and Instructional development. This year we have been instrumental in securing one of the two 2006 Dalhousie University Learning Enhancement Grants in the amount of $10,000 for the redesign of Math 1000.

Summary

The centre continues to provide needed services on a drop in basis to students at the first, second and sometimes third year level. A future challenge will be to explore relevant means of communication in a continuous changing teaching and learning environment.

D-DRIVE, JR.

The D-Drive facility (Dalhousie Distributed Research Institute and Virtual Environment – http://projects.cs.dal.ca/ddrive/), hosted by the Faculty of Computer Science under the direction of Jonathan Borwein, is also having offspring. A suite of two adjacent offices in the Chase Building is about to be renovated and turned into a larger room to house a branch of D-Drive.

In addition to supporting collaborative research, it is expected that this new facility will also be used to offer, or participate in, graduate courses held jointly by the three largest Atlantic universities, namely Memorial, UNB, and Dalhousie, and with likely participation of other universities. *-kd*

A VOICE FROM THE PAST

The job as department chair is full of surprises. Some of them are of the nasty kind, others are just annoying, but occasionally something really pleasant and unexpected comes along.

In March of this year we received a short note from a Dr. J.N. Whiteley of Pietermaritzburg in South Africa, requesting the address of a friend and colleague of his of 45 years ago. This predates even the longest-serving department members by several years, but the old university calendars, of which there is an extensive set in the chair's office, revealed that Dr. Whiteley was a faculty member in this department in the early 1960s.

Fortunately, we have a very nice written record that reaches far into the past, namely Professor Arnold Tingley's historical sketch "Mathematics at Dalhousie", written in 1990. He wrote,

"J.N. Whiteley B.Sc. (Rhodes) Ph.D. (London) was appointed Assistant Professor in 1961/62. This was one of the first appointments made during this period to promise progress. Although he had accepted a two year contract, he resigned after one year. This was disappointing.

"Whiteley was more indifferent to material things than anyone else that I have ever known, a fact which became apparent when he was here for an interview. Adshead must have been away, for I was dealing with him. In those days there was no salary scale, so negotiations were very important. For some reason he was anxious to leave UNB, where he then was, and all he wanted to know was whether we would give him an appointment. Only with the greatest of difficulty did I get him to ask for a reasonable salary and help with moving expenses.

"He was always pleasant and cooperative. The only difficulty I recall in connection with him involved several examination papers from his class being missing at Christmas. Eventually they were found under the seat of his car."

This incident was probably not the reason for Dr. Whiteley's departure, but apparently he did not keep in touch with Dalhousie until a few months ago; he did not know that Professor Adshead had passed away in 1979, and Professor Tingley in 1999. Dr. Whiteley now lives in a retirement home in Pietermaritzburg. *-kd*

GRADUATE STUDENT SOCIETY

The Dalhousie Math & Stats Grad Society has had a wonderful year. The main focus of the society has been to organize social events and continue the Graduate Student Seminar.

The fall term began with a pot-luck and movie night as a means for graduate students to get to know one another. The semester continued with a Halloween party with many interesting costumes. The main event of the fall semester was the annual Martini Party. It was, of course, a very well-attended event and a good excuse for everyone to get dressed up for the night. We had several successful Games Nights over the course of the year which were a great diversion from the stresses of being a grad student. The social event of the winter semester was a dinner at Talay Thai restaurant - which turned out very well.

The main goal of the Math & Stats Grad Society is to promote the interests of the graduate students and to act as a social institution. We have endeavoured to achieve this over the past year. As the winter term is ending, we look forward to planning more events and we wish everyone a wonderful summer.

Margaret-Ellen Messinger (President)
Rob Noble (Vice-President)
Neil McKay (Treasurer)
Rebecca White (Department Liason)
Andrew Hoefel (Computer Resources Committee Member)

DALHOUSIE UNDERGRADUATE MATHEMATICS AND STATISTICS SOCIETY

by Theresa Mader

I am proud to report that the Dalhousie Undergraduate Mathematics and Statistics Society (DUMASS) had a great year. We began it with a bang, hosting a free barbeque that allowed new students and faculty to meet and greet. We were fortunate to have great weather and great company.

This year the society participated in Trick or Eat, a fundraiser for Feed Nova Scotia. On Halloween night, we all dressed in our wackiest and scariest garb and went trick or eating. Traveling door to door, instead of trading candy for a good scare, we asked homeowners to donate non-perishable food items in support of Feed Nova Scotia. It was an indisputable hit. We managed to collect enough food to pack both an SUV and a minivan. We had lots of fun and celebrated with hot chocolate and Halloween goodies in the colloquium room afterwards.

We celebrated our Christmas spirit in November by attending the Parade of Lights. With hot chocolate in tow, we headed down to the corner of University Ave

and South Park Street to get the best view of the parade. It was a lot of fun and brought the kid out in all of us.

February brought cold weather, but with it, the society's annual Wine and Cheese. Really outdoing ourselves this year, the transformation of the colloquium room to a suave social hangout attracted undergraduate students, graduate students, and faculty. It was our pleasure to host and we were so pleased to hear that everyone had a great time.

For the remainder of the year we kept ourselves busy by having several pool nights at Locas, two games nights, a movie night, and some regular aftermaths. All were well attended. As well, we were able to offer first year students both the Christmas and April tutorials, which we are glad to report went very well.

Wine and Cheese Celebrations: (Back Row) *Harry Xu, Dave Claire, Michelle Bilocq, Jim Parks, Marc-Andre Chavy-Macdonald, Steve Chisholm* (Front Row) *Theresa Mader, Isabel Gao, Jill Falkenberg, Lindy DeCoste, Carol Ross*

A new and exciting project that the undergrad society has launched this year is the book buy-back program. The brainchild of Marc-André Chavy-Macdonald, students can sell their books to the society at the end of classes, and the society will take care of selling them the following year. We hope that students will find this service both convenient and helpful.

This year's CUMC is being hosted by Simon Fraser University in British Columbia. We worked hard to raise funds through our semi-annual tutorials, games nights, and fall barbeques. We are proud to be sending a strong group from Dalhousie and hope they have a great time.

On behalf of the society I would like to thank all the faculty, students, and staff that made this year such a success. We would also like to welcome the incoming council members and wish them the best of luck in the upcoming year.

President: Dave Claire
Vice-President: Charlotte Hailey
Treasurer: Marc-André Chavy-Macdonald
Secretary: Isabel Gao
Communications Representative: Victor Bomers
DSS Representative: Hyo-Jin Suh
DSS Representative: Kaitlin MacMillan

TRICK-OR-EAT

by Jill Falkenberg

On October 31, 2006, houses spookily adorned with spiderwebs and carved pumpkins were visited by local costumed children in pursuit of candy and perhaps even a fright. But, as we know, Halloween isn't for just the kids! This year, the Dalhousie Undergraduate Math and Stats Society wasn't about to miss out on this fun door-to-door tradition. With the assistance of the Dalhousie Meal Exchange, math and stats students and their friends from various programs such as engineering, computer science, biology, marine biology, and physics participated in Trick-or-Eat, collecting non-perishable food items in support of the local food bank Feed Nova Scotia. At 6pm, almost 30 costumed participants met at the Chase Building before heading out in groups to collect food from south end Halifax homes. By the end of the night, with the help of a few cars and of course student muscle, various characters such as a pirate, a princess, a cowgirl, a sailor, and a soccer star collected 3 full carloads of donations. A couple of local residents even donated diapers and catfood. After everything was packed away, the participating students returned to the Chase Building for some hot chocolate, chips, and candy. You didn't think we'd miss out on the candy did you?

CUMC CONFERENCE, MONTREAL 2006

The Canadian Undergraduate Mathematics Conference (CUMC) was held in Montreal, Quebec, at McGill University in the 2006 year. Dalhousie sent an excellent group of eleven, from which four presented. The conference was attended by Micah McCurdy, Rachel Manion, Travis Squires, Matt Lewis, Sarah Chisholm, Steve Chisholm, Alex MacLeod, Jill Falkenberg, Dave McNutt, Jim Parks and Theresa Mader. The following talks went spectacularly,

Micah McCurdy	- *Philosophy For The Working Mathematician*
	- *Why Can't We All Just Get Along?*
	- *The Black Art of Category Theory*
Rachel Manion	- *The Singular Story of Orbifolds and a Hyperbolic Fashion Show*
Travis Squires	- *Category of Polynomials*
Matt Lewis	- *Symmetry with Transformation Groups*

The group had a great time, and a new group of students is looking forward to the 2007 CUMC being held at Simon Fraser University in British Columbia.

GRADUATE REPORT – STATISTICS

by Dr. E. Susko

This year we welcomed six new students to our graduate program. Elizabete Almeida, Mei Chen, Amanda Halladay, Yifei Hu, Caroline Urquhart and Scott Wile entered into the MSc program. Currently we have six continuing MSc and three PhD students in statistics. We have admitted three new graduate students and hope to admit another for 2007/2008.

Xiaofei Shi successfully defended her PhD Thesis in September. She is currently a postdoctoral fellow in Biostatistics at the University of Toronto. Eight MSc students completed programme requirements since the last Chase Report:

Melanie Abeysundera (Drs. Field and Gu)
Kin Hung Chan (Dr. Thompson)
Sipi Garg (Dr. Hamilton)
Leah Gerber (Drs. Myers and Susko)
Wenyi Jiang (Drs. Bielawski and Field)
Li Li (Drs. Bielawski and Gu)
Laura MacKenzie (Dr. Dowd)
Paul Sheridan (Dr. Susko)

STATISTICAL EVOLUTIONARY BIOINFORMATICS

Ed Susko, Chris Field and Hong Gu are part of a large collaborative group of statisticians, genomicists and bioinformaticians working on issues in molecular evolution. The group includes faculty members from the Departments of Biochemistry and Molecular Biology (Andrew Roger and W. Ford Doolittle), Biology (Joe Bielawski) and the Faculty of Computer Science (Christian Blouin). A wide variety of projects are being pursued in the general areas of modeling genome and proteome evolution at the most ancient levels of divergence (i.e. at the prokaryotic/eukaryotic split). Specific interests include developing phylogenetic methods and software tools that incorporate lateral gene transfer as a process, more accurate models of protein evolution that account for covarion, rate-shift and 3D structural effects and site-specific amino acid frequencies, developing methods for phylogenetic inference from multiple gene sets and developing methods for estimating confidence regions for phylogenies.

A recent addition to the group is Dr. Rob Beiko who has been nominated for a Tier II CRC in Bioinformatics. Dr. Beiko is a new Assistant Professor in the Faculty of Computer Science and maintains a cross-appointment to the Department of Mathematics and Statistics.

In the past year the group has benefitted from the involvement of MSc students Melanie Abeysundera, Wenyi Jiang, Li Li, Paul Sheridan as well as PhD students Jihua Wu and Liwen Zou. Also part of the group is Postdoctoral Fellow Dr. Huaichun Wang. Dr. Wang continues work on covarion models of sequence evolution as well as obtaining better understanding GC content variation in genomes.

The new MSc program in Bioinformatics and Computational Biology began this year with the admission of Daniel Gaston. The program will allow interested students to obtain the multi-disciplinary training that has become increasingly important in this area of research. Weekly seminar group meetings hosted in the Department are a requirement of the program.

STATISTICS DOWNUNDER

by Dr. Chris Field

I was fortunate to have the opportunity to spend January through March of 2007 visiting several Australian Universities where I have research collaborators. It's always a nice idea to switch seasons during a Halifax winter. Australia is a very comfortable country for a Canadian to visit. We share some common heritage, sense of humour and a general view of life. There is lots of sunshine with very little rain (fine as a visitor but not so great for the locals). A day of rain brings smiles to the faces of most Australians. While in Melbourne, I gave a series of lectures on model building and statistical inference for Biological problems ranging from bird counts to leatherback turtle tracks to amino acid sequences. A treat for me as a birder was to discuss potential research possibilities with the researchers at Phillip Island where there is a large little penguin colony and the famous 'Penguin parade'. I'm very lucky to be able to combine my love of birds with interesting statistical research. While at the Australian National University working on subtle issues in bootstrapping and capture/recapture problems, was able to look out my office window and see crimson rosellas (lovely blue and red parrots), king parrots and noisy sulphur crested cockatoos. Certainly beats the starlings and crows visible from my Chase Office. We finished our trip by spending a week in Tahiti where our colleague, Christophe Herbinger is on sabbatical studying the genetics of the black pearl oyster.

AARMS HAS A BUSY YEAR

by David Langstroth, AARMS Administrator

It's been more than a year now since the Directorship of AARMS transferred to Jonathan Borwein and Richard Wood at Dalhousie. In that time we have been pleased to support a number of important workshops and events across the Atlantic region. Our postdoctoral fellowship program attracted a record number of applicants in 2007, and plans are well under way for the 2007 Summer School, based at Dalhousie, under the Directorship of Pat Keast.

As well as carrying on with these staple activities, there are a number of new initiatives to look forward to. The first of these is that renovations will soon begin in the Chase Building to convert two offices into an AARMS / ACEnet collaboration suite, which will feature audio-visual and computing technologies enabling mathematicians to collaborate with colleagues in other cities, or around the world without having to leave the building.

We are also proud to announce that the first book in our new series, to be published jointly with the AMS will be *A Course on the Web Graph* by Anthony Bonato. The manuscript has been finished and is in production although we don't yet have a date for publication.

This summer, we are also sponsoring an NSERC USRA seminar series involving students at UNB, MUN and Dalhousie, connected by the technology of D-Drive. This summer series, supported also by NSERC Atlantic, will serve as a test bed for many of the technologies and organizational systems which we intend to employ in the ASCI project (The Atlantic Shared Curriculum Initiative). ASCI will be a trial of the concept of delivering fourth year/graduate courses

to students located in all three of these universities using Access Grid and other delivery methods.

Finally, we are looking to the near future, and have submitted a Letter of Intent to NSERC under their Major Resources Support Program. Our proposal is to greatly enhance the AARMS budget through contributions from NSERC, the provinces, the universities and industry in order to provide support to researchers in the mathematical sciences in Atlantic Canada proportionate to what is currently the case in central and western Canada where the three mathematical Institutes are based.

DALHOUSIE MATHEMATICS OUTREACH

It was another successful year for Dalhousie Mathematics Outreach. Our two outreach programs, the Nova Scotia Math League and Dalhousie Math Circles, had their highest participation level since their foundation in 2002. We hope to keep expanding until our programs are available to all high school students in the province.

NOVA SCOTIA MATH LEAGUE

The Nova Scotia Math League (NSML) started its 2006/2007 season with an infusion of new students, welcoming three new regions participating full time. This brings the number of regions enjoying the NSML to six: Antigonish, Bridgewater, Halifax, Sydney, Truro, and Wolfville. We had over eighty teams of four students each from across the province participating in our regular season contests. During these three hour contests, students are given ten team problems and five minutes in which to solve them. After the correct answer is given, students are encouraged to present their solution to the group. After the team problems, there are two ten minute relays, a pairs relay and an individual relay. In each relay, teams are given questions whose answers filter to succeeding questions as variables. Students from all forms of educational background, public, private, or home-schooled, are welcome to participate in our contests. Participation is free and schools are welcome to send as many teams as there are willing students. One school this year had enough excited students to send five teams to one of our contests.

After the regular season, the top twenty-two teams are invited to a provincial final, this year held in Halifax. At the provincial final, not only do students have team questions and relays, but there are also two full solution questions required, giving high school students a taste of university level mathematics. When the dust had settled, Queen Elizabeth High from Halifax was our provincial winner, receiving 51 points from a possible 70. To congratulate each team attending the final, all participants received medals; the top three received gold, the next five silver, and the remainder bronze. The results and locations for the provincial final participants are as follows:

GOLD: Queen Elizabeth High (Halifax), Halifax West (Halifax), J.L. Ilsley (Halifax)

SILVER: Sydney Academy (Sydney), Dr. John Hugh Gillis (Antigonish), Kings Edgehill (Wolfville), Dr. John Hugh Gillis (Antigonish), Liverpool (Bridgewater)

BRONZE: Halifax Grammar (Halifax), Hants East (Truro), CEC (Truro), Parkview (Bridgewater), Halifax West (Halifax), Queen Elizabeth High (Halifax), Kings Edgehill (Wolfville), Auburn (Halifax), Halifax Grammar (Halifax), Kings Edgehill (Wolfville), Bridgewater (Bridgewater), CEC (Truro), Glace Bay (Sydney), Sydney Academy (Sydney)

Our contest could not be run without all the volunteers who help throughout the year, either by submitting problems, helping to run events, organizing food, or booking rooms. The NSML would like to extend a huge thanks to all those who helped out in all capacities this year.

We will use our summer to replenish our problems bank and to start preparing for an even larger year next year. We are always looking for interesting problems appropriate for high school students. If you would like to submit problems, get involved, or learn more about the NSML, please contact Meghan Rose Allen (ameghan@mathstat.dal.ca) or Richard Nowakowski (rjn@mathstat.dal.ca), or visit our website (http://www.mathstat.dal.ca/~mathleague/).

DALHOUSIE MATH CIRCLES

Our other outreach program, the Dalhousie Math Circles, also expanded this year, having talks both in the Autumn and Winter terms. The Dalhousie Math Circles are engaging talks from all areas of mathematics, designed to foster interest in mathematics among talented high school students and expose them to mathematics beyond the high school curriculum. On nine Wednesday evenings throughout the school year, high school students and their teachers were invited to the Chase Building for pizza, conversation, and math. Our talks are becoming more popular and well-attended, making it sometimes hard to find a seat. Our speakers ranged from graduate students, post-docs, to full professors, with speakers from Dalhousie, Saint Mary's, and the University of New Brunswick. This year's talks were:

October 25, 2006
Paul Ottaway, Graduate student at Dalhousie
Problem Solving Techniques and Tricks

November 8, 2006
Vaneeta Grover, Graduate student at Dalhousie
An Introduction to Statistics

November 22, 2006
Dr. Karl Dilcher & Dr. Keith Johnson, Dalhousie
Cryptography

December 6, 2006
Dr. Peter Selinger, Dalhousie, and Dr. Kia Dalili, Post-Doc at Dalhousie
Interesting Mathematics

February 7, 2007
Dr. Keith Taylor, Dean of the Faculty of Science,
Cardinal Sins of the Infinite

March 7, 2007
Dr. John Grant McLoughlin, University of New Brunswick
Counting Problems

March 21, 2007
Dr. Dante Manna & Dr. O-Yeat Chan, Post-Docs at Dalhousie University
Squaring the Pigeonholes: Simple Ideas to Solve Hard Problems

April 4, 2007
Vaneeta Grover, Graduate student at Dalhousie
Fun with Probability

April 25, 2007
Dr. John Irving, St. Mary's University
A Bag of Tricks: Problem Solving Practice

We are always looking for students, post-docs, and professors who are interested in giving talks geared towards high school students. If you would like to participate next year, please contact Angela Siegel (siegel@mathstat.dal.ca) or Richard Nowakowski (rjn@mathstat.dal.ca) or visit our website (http://www.mscs.dal.ca/~mathcircles/).

MITACS REPORT

by Dr. Jeannette Janssen

The research project "Modelling and Mining of Networked Information Spaces MoMiNIS)", led by Jeannette Janssen and Evangelos Milios (Computer Science), was successfully renewed by MITACS this year. The project is financially supported by a number of government agencies and companies, and receives matching funding from MITACS. The project has ten members from five universities across Canada, and supports fifteen graduate students. In our department, MoMiNIS is providing support for Pawel Pralat and two MSc students starting in September.

APICS 30TH ANNUAL CONFERENCE

by Dr. Roman Smirnov

The Atlantic Provinces Council on the Sciences (APICS) held its 30th Annual Conference in Mathematics, Statistics and Computer Science at Cape Breton University in Sydney, Nova Scotia on October 13-15, 2006. Two of the symposia (one on *Mathematical Modelling and Simulation* and the other – *Multivariate Statistical Analysis*) were sponsored by the Atlanic Association for the Research in Mathematical Sciences (AARMS). Traditionally, such meetings host many scientific activities that include competitions among the best students from across the Atlantic Region, conferences, symposia, science book

fairs, etc. The 30th Annual Conference was no exception with a strong participation from the Dalhousie community and the Department of Mathematics and Statistics. Thus, Keith Thompson gave the Field Lecture in Statistics entitled *Coastal Flooding and Climate Change*, Arnold Mitnitski delivered a lecture in the AARMS symposium on *Mathematical Modelling and Simulation*. Moreover, several of our graduate students, Melanie Abeysundera, Amanda Halladay, Karyn McLellan, Jane Tougas and Rebecca White also participated and gave talks on their research. While four of our undergraduate students, Ashley Kelly, Theresa Mader, Jim Parks and Doug Staple formed two teams to participate in the APICS Mathematics Competition. They were coached by Kia Dalili. In addition, the following Faculty also attended the meeting and participated in its various activities: Karl Dilcher, Chris Field, Hong Gu, Roman Smirnov and S. Swaminathan.

STUDENT COMPETITIONS

In addition to the APICS competition already mentioned above, six students wrote the very challenging Putnam Competition in early December, 2006. Jim Parks, a graduating honours student in Mathematics, did very well, being ranked 600th out of 3640 students who wrote the competition. Dr. Kia Dalili was the coach for this competition as well.

In early February, 2007, a student team consisting of Carol Ross, Harry Xu, and Neil L. Jackson wrote the Mathematical Contest in Modeling organized by COMAP (the Consortium for Mathematics and Its Applications). They received certificates for having successfully participated in this contest. Their coach was Dr. Georg Hofmann. *-kd*

CONFERENCE IN HONOUR OF TONY THOMPSON

On March 30 and 31 this department hosted a conference, sponsored by AARMS, in honour of Tony Thompson at the occasion of his 70th birthday. The focus of the conference was on Convex Geometry, and two one-hour talks were given by leading experts in the field: Rolf Schneider of the University of Freiburg in Germany spoke on *Stability results in convex geometry*, and Juan Carlos Álvarez Paiva spoke on *The Holmes-Thompson volume in normed and Finsler spaces*.

A further 13 half-hour talks were presented by participants from Dalhousie, the Atlantic region, and abroad. One of them was by Tony's former Ph.D. student Rolf Clack who was unable to attend; his talk was presented by the conference organizer. The speakers from Dalhousie were Jonathan Borwein, Georg Hofmann, S. Swaminathan, and Keith Taylor. One family of three attended the conference: Art Finbow, his son Stephen Finbow, and his daughter Wendy Finbow-Singh, all mathematics Ph.D.s and university faculty who had all been taught by Tony. Wendy, whose M.Sc. thesis had been co-supervised by Tony, also gave a talk at the conference.

A recurring theme was how long a speaker had known Tony. The first speaker, Swami (*Isometries on metric spaces*), held the record almost until the end with 39 years, but was beaten by the last speaker, Alan Thompson (*Radon transforms and radar remote sensing*) who has know Tony since birth. A conference dinner with more than 40 guests took place on the Friday evening, March 30.

Further information on this event can still be found at http://www.aarms.math.ca/events/atlantic/ *-kd*

THE IRON STAPLER AWARD

One fine April day, David Iron asked whether he had the right to his own office stapler. He was informed by the Chair that upon a sufficient amount of committee work, he would indeed receive his own stapler.

On May 9, 2007, David's work on the ad-hoc appointments committee for a mathematics instructor was officially over, and in the afternoon of that day the Chair and the Administrator presented him with a shiny new stapler, plus two bars of matching staples. A truly moving ceremony, almost (but not quite) worth an official photograph. Happy stapling, David! *-kd*

CHEBUCTO COMMUNITY NET

by Andrew Wright

This year Nova Scotia's oldest independent Internet Service Provider stands at a crossroad. For thirteen years members of the Chebucto Community Net have laboured for the cause of providing universal access to the tools of communication.

We progressed from offering text-only email and internet access which can be used by virtually any computer capable of dialing a phone to offering full PPP dialup connections. We've kept the accessibility of the past running to this day as we've continued to add services and improve our existing offerings.

Dozens of community groups, non-profit organizations, information resources and even a few small businesses make their home on the heavily trafficked Chebucto web servers. More than a thousand people, many of them low income get their internet access from us.

These days that simply is not enough and we have watched as several small local commercial internet providers have gone out of business and our own membership numbers have started to fall.

The evolution of technology and economic realities have brought back the Digital Divide, the divide between those people with access and the people with less resources without access.

Lower income people these days tend not to have land-line phones. Computers are available but not internet access. High speed services cost more than many can afford so many people simply do without.

Our solution is to offer a wireless high speed internet access that will be hosted by members of the community for the benefit of everyone. Full access will cost the same as our PPP dialup access with the added benefit of completely free high speed access for all to local websites including government resources.

Since announcing the plan last year progress has been slow but steady and the first nodes of the Chebucto wireless service should be online Spring 2007.

We would like to thank the Department of Mathematics and Statistics for the continuing support, without which there would be no community net anywhere in this province.

CANADIAN MATHEMATICAL SOCIETY (CMS) CAMP

by Dr. C.C.A. Sastri and S. Sikka

The Dalhousie-CMS math camp, by now an annual tradition, was held from the 17th to the 21st of July in 2006. It was done under the auspices of the Canadian Mathematical Society (CMS) and Dalhousie University, with financial support from various sources, including Dalhousie, ESSO, and NSERC/PromoScience. This was the seventh in a series that began in 2000. The organizers, as before, were Chelluri C.A. Sastri and Suraj Sikka.

The camp is aimed at high school students in Nova Scotia. The purpose is to identify, stimulate, and encourage mathematical talent. Accordingly, letters calling for nominations were sent out in early March to all the high schools in the province, both public and private. The stipulation, again as before, was that a school could make no more than two nominations and that the nominees were to have finished either Grade 10 or Grade 11. The response from public schools was slightly worse than the previous year's, which itself was poor and down from earlier years. It was barely sufficient to provide a pool of students from which to make the selection. The response from private schools was poor, as before. Altogether, there were 28 applicants. Clearly we have a problem attracting good students. Now, for the last few years Dalhousie has been running two outreach programs, "Nova Scotia Math League" and "Math Circles." Richard Hoshino, a graduate student here and a mainstay of the CMS math camp in the past, initiated both of them. He put a lot of work into those programs and established good connections with high school students and teachers in the province. Paul Ottaway and Angela Siegel, graduate students, and Richard Nowakowski, a professor, are continuing the programs initiated by Richard. We are hoping that their efforts will bear fruit next year, in the sense of making recruiting easier.

In the selection process, we again encountered a problem we had faced before: One of the criteria we have used for acceptance into the camp is performance on the Cayley/Fermat contests held by the University of

Waterloo. However, it is becoming increasingly difficult to do so since many schools are not participating in these contests for financial reasons. This makes the task of selection harder, for the contests provide a uniform measure of excellence. The other criteria we use, such as grades and letters of reference, are useful but have the disadvantage of considerable variability.

Equity of distribution in terms of gender as well as geographical location was also an important consideration. In the end, eleven boys and ten girls representing almost all the regions in the province were selected.

The format of the camp was essentially the same as in previous years. The instructors were Karl Dilcher, Joanna Flemming, David Iron, Robert Milson, and Angela Siegel, all from Dalhousie University, and Robert Dawson and Wendy Finbow-Singh from St. Mary's University. Nobody, among the instructors, organizers or helpers, of whom there were many, received any payment for services rendered. However, all of them were invited to a thank-you dinner or lunch, depending upon what was convenient for them.

The students arrived, and registered, on Sunday, July 16, between 1:30 and 2:30 pm. The organizers and the two chaperones, Sunita Gupta, and Paul Ottaway, received them. Paul is a graduate student in our department, and Sunita a high school mathematics teacher. Both of them had worked as chaperones before. The students and the chaperones all stayed at Howe Hall, a student residence. They got along quite well; the students, in their comments after the camp, described their interaction with the chaperones in very positive terms.

Following registration, a reception was held for the students and their parents.

Computers were an integral part of the camp. The computer lab belonging to the Faculty of Engineering and located in the Dunn Building was placed at our disposal for the entire duration of the camp. For this we are grateful to the Engineering Faculty and, in particular, to Reg Peters, who is in charge of the lab. It was used to teach Maple and geometry. In addition, one of the instructors, Robert Dawson, taught the students how to print on their T-shirts some of the work they had done in class. For this purpose, each of the students was given a T-shirt. They thoroughly enjoyed this activity, and the individualized T-shirts look beautiful.

Each day of the camp was divided into a morning session (9:00 to 12:00, with a twenty-minute snack break) and an afternoon one (1:30 to 3:30, with a ten-minute break); please see the enclosed schedule for details. Each session consisted of a lesson. The lessons were not just lectures; there was plenty of interaction, problem solving and hands-on work. Since this format had worked well in previous years, we decided to follow it this year also. The consensus was that the camp went very well.

We are grateful to Ron Fitzgerald of MathResources Inc. for donating packages of their Math Dictionary. We believe the students were pleased to get them.

There were several extra-curricular activities—bowling, chess, pizza party, etc. One evening, there was a presentation by Travis Squires, an honors student of mathematics in our department, concerning the transition from high school to university. This year, the Atlantic Jazz Festival fortuitously took place in the same week as the math camp, and the chaperones took the students to a concert in the festival. Since the price of admission ($20 per person) was higher than the amount budgeted ($10 per head) the students paid the difference. (We had asked the students and their parents at registration time whether this would be acceptable, and they had all said yes. We were prepared to subsidize any students who couldn't afford to pay the difference, but didn't have to.) Every day, after the academic sessions were over, the students spent about an hour and a half playing sports or working out at Dalplex, the university's athletics and sports complex.

There was a barbecue lunch after the closing ceremonies on Friday the 21st. The students were picked up by their parents afterwards.

Both Dalhousie and the CMS supported the camp. The CMS, with support from ESSO, NSERC/PromoScience and perhaps other sources, contributed $3000.00. Dalhousie supported the camp in many ways: $3000.00 from the President's Office, $2000.00 from the Office of the Dean of Science; free use of the classrooms and

the computer lab; free secretarial help, photocopying and miscellaneous items and services from the department; and free faculty time. We received enthusiastic help and support from our colleagues in organizing the camp and are grateful for it. A registration fee of $50 per student was charged except in cases of financial exigency.

In closing, it is our pleasant duty to thank all the instructors, without whose hard work and dedication the camp would not have been possible. We are also pleased to thank Gretchen Smith, the departmental administrator, and the secretaries, Maria Fe Elder, Paula Flemming, and Jackie Harnish-Grandy, for their unstinting help.

MATH CAMP FOR BLACK STUDENTS

by Dr. R.P. Gupta

The fifteenth mathematics camp for black students was held the second week of July 2006. The camp was organized by the Department of Mathematics and Statistics and the Black Educators Association of Nova Scotia. Thirty-two students were selected to attend the camp from schools all over Nova Scotia.

The aim of the camp is to generate interest in mathematics, statistics, & computer science so these students can pursue further studies in these subjects.

The students are generally of grade six and seven and are brought to the Dalhousie campus. While here they stay in Howe Hall.

Mornings and early afternoons are devoted to lectures in mathematical, statistical and computer activities, while late afternoon and evenings are devoted to extra curricular activities where they can apply the talents they have learned in the classes.

They are taken to Dalplex for one hour each afternoon where they participate in swimming and play other games such as basketball, tennis, etc.

They also visited the Nova Scotia museum of history and science and the Discovery Centre. Students of the Camp also spent an evening at the Black Cultural Centre in Dartmouth where they were told about the mathematicians and scientists of black origin and also saw a film.

The students were taught and cared for by seven instructors (three university professors and four school teachers) and four chaperons. The Camp was organized under the directorship of Professor R.P.Gupta of Dalhousie University and Mr.Gerry Clarke of the Black Educators Association. It was financially supported by NSERC Promo Science Grant, Dalhousie University and the BEA.

AARMS SUMMER SCHOOL

by Drs. Tony Thompson, Renzo Piccinini, Summer School Directors

The AARMS Summer School took place at Dalhousie University from Sunday July 16 to Saturday August 12. Four courses were offered: *Elliptic Curve Cryptography* by Mark Bauer of Calgary, *Massive Networks and Internet Mathematics* by Anthony Bonato of Wilfrid Laurier, *Algebraic Geometry* by Rick Miranda of Colorado State and *Introduction to Wavelet Theory* by Anita Tabacco of Politecnico di Torino. Each course met for 90 minutes each day.

There were 38 students altogether. Of these, 11 were from Dalhousie and the other 27 were from 7 Canadian Provinces and 6 other countries. Some students from farther afield (Turkey and Iran) were unable to come for a variety of reasons.

In addition to the formal lectures there were a number of social activities. These included a welcoming reception sponsored by the Vice President Academic on the day of arrival, a pizza lunch the following day, a barbecue with members of the CMS math camp, a bus trip to Lunenburg and dinner on the waterfront (this was partially funded by Clearwater Fine Foods) and a final farewell barbecue put on by the Graduate Students' Society on the last day of classes.

This “barebones” account of the programme does not convey the sense of excitement and the pleasure of learning which pervaded the department for the four weeks of the school. These were engendered by the hard work and dedication of the four instructors and the students. Here are a couple of letters about the summer school received afterwards:

"Everyone involved in helping to make the AARMS Summer school a success,

I would like to thank you all for helping to put on a stimulating, exciting and very valuable learning experience in Halifax over the past month. I thoroughly enjoyed myself in and out of the classroom, and found the topics being taught to be fascinating.

The AARMS organization does a great service to mathematics students nationally and internationally by making such a phenomenal opportunity available.

Thanks so much for making this a great summer,"

Daniel Simeone, McGill University

"From my heart I thank you for accepting me at AARMS2006. For me it was a very pleasant, exciting, and good learning experience. The quality of all the instructors and the lecture material was outstanding. I made also good friends with the other participants. I wish you all the best!"

Zhivko Nedev

STATISTICAL CONSULTING

by Dr. David Hamilton

The Statistical Consulting Service operated at a reduced level of about 10 hours per week this year. Our consultant, Vaneeta Grover, is also a PhD student in Statistics. There were clients from many disciplines, including biology, environmental studies and medicine and services ranged from simple advice to database management to more complicated statistical analysis. Some projects were carried out by graduate students in the Statistical Consulting course.

COMPUTING RESOURCES COMMITTEE

by Dr. Michael Dowd

In addition to dealing with ongoing issues related to the operation and expansion of the Chase computing environment, the main activity of the departmental Computing Resources Committee (CRC) was its new 'Policy for Responsible Computing'. This policy provides a set of guidelines for all users of the Chase computing environment, and supplements the more general guidelines of Dalhousie's University Computing and Information Services (UCIS). The policy included statements on acceptable computing usage, software and copyright concerns, as well as addressing privacy and disruption issues. Full details can found at www.mscs.dal.ca/crc_policy.html.

In addition, congratulations are in order for the successful NSERC equipment grant application by David Iron and others. This will allow for further upgrading and improvement of the Chase computing environment.

CRC Members: *Michael Dowd (chair), Pat Keast, Balagopal Pillai, Peter Selinger, Gretchen Smith*

GRADUATE STUDENT SEMINAR

by Rob Noble
Chair, Graduate Student Seminar
Vice President, Graduate Student Society

The purpose of the Graduate Student Seminar is to host a series of talks that are both of interest to and at a level suitable to the graduate student community. These talks include ones given by graduate students themselves where they are provided the opportunity to gain the invaluable experience of preparing and presenting their research and other academic interests as well as ones given by faculty in the department that serve to introduce the graduate community to current day research in the areas of mathematics and statistics. The Graduate Student Seminar has also provided the Graduate Student Society the opportunity to gain experience in organizing such events. A detailed record of the activities of the seminar can be found on the seminar webpage:

http://www.mathstat.dal.ca/~msgrads/seminar

The Graduate Student Society would like to thank all those who attended and/or participated in the seminar this year. Below is a detailed list of the speakers together with the titles of their talks who participated in the seminar this academic year:

Fall 2006

Benoit Valiron, *A Short Tour of Quantum Computation*, October 10.

Rob Noble, *An Algebraic Proof of Quadratic Reciprocity*, October 17.

Pawel Pralat, *N is a Number – A Portrait of Paul Erdös*, October 24.

Rebecca White, *Introduction to LaTeX*, October 31.

Andrew Hoefel, *Monomial Relations and Supported Resolutions*, November 7.

Geoff Cruttwell, *When Does 0+0=2?*, November 14.

Robert Milson, *From There to Here: The Connection Connection*, November 21.

Karl Dilcher, *A Pascal-Type Triangle Characterizing Twin Primes*, November 28.

Andrew Hoefel, *A Survey of Monomial Resolutions: MSc Thesis Presentation*, December 5.

Winter 2007

Travis Squires, *Inverse Semigroups*, January 23.

Matt Lewis, *Measure Theory and the Baire Category Theorem*, January 30.

Dave McNutt, *Dr. Friedmann; Or How Einstein Learned to Stop Worrying and Love the Big Bang*, February 6.

Neil McKay, *An Impartial View of Combinatorial Games*, February 13.

Roman Smirnov, *Mathematics is the Study of Analogies Between Analogies*, February 27.

Benoit Valiron, *Lambda Calculus or the Art of Proof Rewriting*, March 20.

Rebecca White, *Gershgorin and His Circles*, March 27.

Karl Dilcher, *Fermat's Last Theorem*, April 3.

HONOURS SEMINARS, 2006-2007

by Dr. Robert Paré

We had a full year of excellent talks in the honours seminar. The last six talks were by honours students presenting the results of their honours thesis. "Thank you" to all who participated.

Sept 13, John Clements
The Extraordinary Impact of Mathematics on Modern Science: An Example from the Cardiology OR

Sept 20, Roman Smirnov
The Geometry via Lie Groups and Moving Frames: An Introduction to Elie Cartan's Philosophy

Sept 27, Karl Dilcher
Much ado about nothing: Zeros of polynomials

Oct 4, Sara Faridi, Keith Johnson, Roman Smirnov, Keith Taylor
The 2006 Fields Medalists

Oct 11, S. Swaminathan
Morley's Theorem

Oct 18, Pat Keast
Catching Transitory Phenomena with Numerical Software for Solving Ordinary Differential Equations

Oct 25, Keith Taylor
The Golden Ratio; Another Look

Nov 1, Theodore Kolokolnikov
Polynomial interpolation and numerical integration

Nov 8, Richard Nowakowski
Playing Games

Nov 15, Tony Thompson
Circles around Chasles's Theorem

Nov 22, Robert Paré
Good theorems produce good concepts: A case study

Jan 10, Kia Dalili
Edge Ideals: Bridge Between Graph Theory and Commutative Albegra

Jan 17, Rob Milson
Abel and his integrals

Jan 24, David Iron
The Chemical Basis of Morphogenesis

Feb 7, Richard Wood
Some things every math student should know (but probably doesn't)

Feb 14, Geoff Cruttwell
A Look at Some Classical Mathematical Structures

Feb 28, Theresa Mader (Supervisor: Jeannette Janssen)
Directed Disk Graphs and A Proposed Algorithm for the World Wide Web

March 7, James Parks (Supervisor: Karl Dilcher)
A Counter-example to Euler's Conjecture

March 14, Harry Xu (Supervisor: Alan Coley)
Pricing Stock Options with a Stochastic Volatility

March 21, Michelle Bilocq (Supervisor: Peter Selinger)
First-Order Logic Approach to Solving Cryptographic Protocols

March 28, Lindy Decoste (Supervisor: Robert Paré)
Theory of Measurement

April 4, Anne Loosen (Supervisor: Richard Nowakowski)
Directions for Phutball

MATHEMATICS COLLOQUIUM IN THE ACADEMIC YEAR 2006/07
by Dr. Roman Smirnov

The following is a list of speakers, their affiliations and the titles of their talks. Local hosts/organizers are given in parenthesis:

August 10, 2006, Colin Cooper, King's College, University of London: *The cover time of random walks on random graphs* (Jeannette Janssen).

September 25, 2006, Arnold Mitnitski, Dalhousie University: *Towards theoretical and mathematical biology: mathematical modeling of aging* (Roman Smirnov).

October 2, 2006, Sigbjorn Hervik, Dalhousie University: *Dynamical systems in cosmology* (Alan Coley).

November 3, 2006, AARMS Distinguished Lecture/Special Colloquium by Terry Rockafellar, University of Washington: *Approaches to Risk in Optimization Under Uncertainty* (Jon Borwein/Richard Wood).

November 14, 2006, Alexei Cheviakov, UBC: *A two-dimensional metastable flame-front and a degenerate spike-layer problem* (David Iron/ Theo Kolokolnikov/Roman Smirnov).

November 30, 2006, Alf van der Poorten, CeNTRe for Number Theory Research: *In Thrall to Fibonacci* (Karl Dilcher).

February 12, 2007, Karen Chandler, Illinois: *Multiple conjectures and multiple theorems on multiple points* (Karl Dilcher).

March 5, 2007, Neil Calkin, Clemson University: *Clemson's research experience for undergraduates (REU)* (Jon Borwein/Karl Dilcher).

March 12, 2007, Chelluri Lecture by Dan Goldston, San José State University: *Are there infinitely many twin primes*? (Alan Coley/Karl Dilcher).

March 26, 2007, Mikhail Kotchetov, Memorial University of Newfoundland: *Group gradings on simple Lie algebras* (Roman Smirnov).

April 2, 2007, Aaron Lauve, UQAM: "*Questions concerning sums and products of matrices (with answers!)*" (Kia Dalili/Sara Faridi).

April 16, 2007, Karl Dilcher, Dalhousie University: *Euler, the master of us all* (S. Swaminathan).

THE STATISTICS COLLOQUIUM

by Dr. Hong Gu

September 21, 2006. Dennis Pilkey, Director, Community Counts, Nova Scotia Department of Finance.1723 Hollis Street. *The use of the Community Counts syste*m.

September 28, 2006. Huaichun Wang, Dept. of Math. & Stat., Dalhousie University. *Modeling covarion process of protein evolution*.

October 5, 2006. Michael Dowd, Dept. of Math. & Stat., Dalhousie University. *Statistical Estimation for Nonlinear Stochastic Dynamical Sy*stems.

October 19, 2006. Tessema Astatkie, Department of Engineering, Nova Scotia Agricultural College. *Application of two-level un-replicated factorial designs in agricultural field experiments*.

October 26, 2006. Paul Sheridan, Dept. of Math. & Stat., Dalhousie University. *On Issues of Singularity for Confidence Regions and Hypothesis Tests for Topologies Using Generalized Least Squ*ares.

November 2, 2006. Yonggan Zhao, Faculty of Management, Dalhousie University. *Weak Interest Rate Parity and Currency Portfolio Diversification*.

November 9, 2006. Christian Blouin, Computational Biology and Bioinformatics, Faculty of Computer Science, Dept. of Biochemistry and Molecular Biology, Dalhousie University. *Protein phylogeny using atomic coordinates*.

November 16, 2006. Robert Beiko, Faculty of Computer Science, Dalhousie University. Director of Bioinformatics, Genome Atlantic. *Evolutionary Themes in the Microbial World*.

November 30, 2006. Guoqi Qian, Department of Mathematics and Statistics, The University of Melbourne, VIC 3010 Australia. *On Time Series Model Selection Involving Very Many Candidate ARMA Models*.

March 29, 2007. Grover, VK, Department of Mathematics and Statistics, Dalhousie University. Hardy-Weinberg *Disequilibrium and its application in testing disease association*.

April 16, 2007. Rolf Turner, Department of Mathematics and Statistics, University of New Brunswick. *Direct Maximization of the Likelihood of a Hidden Markov Model*.

IN MEMORIAM

Professor Eric Mercer passed away on September 4th, 2006, at the age of 91. For many years, until several years after retiring, he taught mathematics courses in this department, in particular a precalculus course. At the same time he served as Assistant to the President. Until just a few year's ago Eric was a regular participant of the department Christmas parties and other activities.

Professor Ransom A. (Ram) Myers passed away on March 27th, 2007, at the age of 55. Ram was one of Dalhousie's most respected and most active researchers. He was a member of the Department of Biology, but he had many connections with this department, mainly through faculty and graduate students in the Statistics Division. He also received an M.Sc. in Mathematics in 1990 under the supervision of Dr. George White, then a faculty member here. An appreciation of Ram's life and his achievements, with several other links, can be found at http://as01.ucis.dal.ca/ramweb/. *–kd*

BRAIN TEASERS

Edited by
Dr. S. Swaminathan

1. **Assigning Numbers**.

Assign the numbers 1,2,3,4,5,6 to the vertices and sides of a triangle in such a way that each number occurs once and the number assigned to each side is the sum of those assigned to its endpoints. In addition, can the analogous problem for the square, pentagon and hexagon be solved, where the numbers go up to 8, 10 and 12 respectively?

2. **Two wrongs make a right.**

In the following addition each letter represents a different digit, and no 0 is allowed. If correct figures are substituted the addition will work correctly. There are several ways of doing it.

```
  W R O N G
  W R O N G
R I G H T
```

3. **Find the missing number**.
All but one of the numbers from 1 to 100 are read to you, one every ten seconds, but in no particular order. You have a good mind, but only a normal memory, and no means of recording information during the process. How can you ensure that you can determine afterward which number was not called out?

ANSWERS TO THE BRAIN TEASERS will be posted on the department website: *www.mathstat.dal.ca*.

4. **To Have or Not to Have**
LAUGHING has it, but not CRYING.
HIJACK has it, but not TERRORISM.
FIRST has it, but not SECOND.
AFGHANISTAN has it, but not TAJIKISTAN.
CALMNESS has it, but not NOISE.
DEFINE has it, but not DECIDE.

What is it?

5. **Message from an Incommunicado**.
However much authorities tried, it seemed impossible to prevent news from traveling between cells in prisons, and that is why the rules of a certain world power went into such extremes that one of their scientists, one in possession of secrets, was an agent for an unfriendly foreign power. He was an extremely subtle and tricky character, but they had great hopes that they would break him. It was suspected that other agents might have penetrated the prison where he was held, but they meant to make it impossible for him to communicate from his cell. He was kept naked, in a very small cell, which was suspended from strings in a deep vault in such a way that no knocking nor any kind of sound could be emitted. His food, drink and other necessities went into the cell under strict supervision by trustworthy jail staff. All types of waste, hair and nail clippings were handled by the same people and disposed of in such a way that no one could glean a coded message from any such source. Careful monitoring equipment made quite sure that no radiant signal of any kind emerged. Yet, in spite of all these precautions, a signaling system got established and the tricky prisoner, using a prearranged code, managed to transmit messages to accomplices on the prison staff but outside the hidden circle of trusted jail members. How did he communicate?

CHASE REPORT

Is published for alumni and friends of the Department of Mathematics & Statistics, Dalhousie University.

We welcome your suggestions and comments for future issues.

Editor: Gretchen Smith, Administrator
gretchen@mscs.dal.ca
Phone: (902) 494-2572
Fax: (902) 494-5130

Department of Mathematics and Statistics
Karl Dilcher, Chair
Bruce Smith, Statistics Director
Jeannette Janssen, Mathematics Director
Keith Johnson, Mathematics Graduate Coordinator
Ed Susko, Statistics Graduate Coordinator

PICTURES FROM THE TONY-FEST, MARCH 30/31, 2007

Keith Taylor, Jonathan Borwein, Sonya Kovalevskaya

J. C. Álvarez Paiva, Tony Thompson, Rolf Schneider, Gautier Berck


01/01