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Natural Sciences and Engineering Research Council of Canada

NSERC Contact

Investing in people, discovery and innovation

From 15th to 5th: The Race Is On

Normally, I use this space to let you know about developments at NSERC or to offer you my point of view on issues of the day that are likely to affect Canadian science and engineering research. This month, however, I'm going to step aside, as it were, and let another member of Council have his say.

Dr. Angus Bruneau

Dr. Angus Bruneau has been a member of NSERC's Council since 1995. He is also the Chair of the Board of Fortis Inc. of St John's, Newfoundland, and a former professor and founding dean of engineering at Memorial University. Because of his varied background, Angus has a broad perspective and can speak with real authority of the interface between academic research and Canada's economy. Recently, he wrote to a number of people about NSERC, and I think you'll be interested to read what he had to say. His letter is reproduced, with his permission, below.

Tom Brzustowski
President, NSERC

August 29, 2001

Dear ……,

The government has set itself a bold, dramatic and measurable goal — to move Canada from fifteenth to fifth place among the most competitive and innovative countries, as measured by relative investment in R&D, by the year 2010. This is a commitment of historic importance — one that could make the difference between Canada being a world leader or a follower in the 21st century.

The goal has been set, but how do we get there? The government is poised to lay the foundation of its strategy this fall, and that's why I'm asking Canadians who know the importance of science and engineering research, to make their views known.

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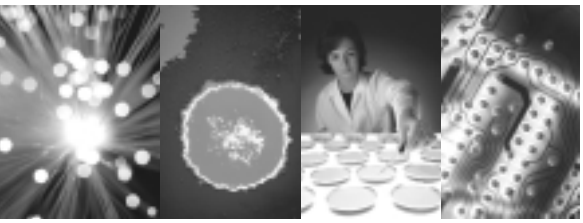
www.nserc.ca



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NSERC is Canada's instrument for promoting and supporting university research in the natural sciences and engineering, other than the health sciences.

NSERC supports both basic university research through research grants and project research through partnerships among universities, governments and the private sector, as well as the advanced training of highly qualified people.

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Continued from cover page

Getting to fifth place won't be easy. It means drastically improving our own R&D performance at a time when virtually every other country is moving in the same direction. Fifth place is a moving target. The programs we design must therefore be right, deploying our limited resources wisely.

Let me share with you my own perspective: I believe that the Natural Sciences and Engineering Research Council (NSERC) is key to unlocking Canada's R&D potential.

NSERC's programs have three features that make them essential for maintaining and advancing Canada's place in the global economy.

First, the advanced training through research in science and engineering that NSERC makes possible produces the ultimate knowledge workers — people who can create knowledge, assess it, and use it productively — not just in research but throughout the economy.

Second, researchers supported by NSERC create the very raw material of progress: the new knowledge on which technological innovation depends. And, because they work to world standards, they also give Canada access to useful new knowledge created elsewhere.

Third, NSERC has a proven track record of engaging Canadian companies of all sizes in all sectors in advanced R&D, and helping them translate research results into innovations and market successes.

But there's something lacking. Today, some two thousand scientists and engineers with degrees obtained with NSERC support enter the job market every year. That's a lot of smart people, but not nearly enough relative to our population. We rank only *twelfth* among the nations for scientists and engineers per capita. To be a player on the world stage, we need to produce at least twice as many by doubling the current NSERC investment in talented undergraduates, graduate students and postdocs.

Winning depends on having enough of the right people on your team, and NSERC support can help provide them. Think about it: can we really hope to move up ten places if the countries we want to pass have so many more highly qualified people than we do?

The government will shortly be deciding on the first steps toward moving Canada to fifth place. I believe it can't be done without a bigger and stronger NSERC, which has the mandate, the tools and the experience to move Canada to a higher new level of R&D and to sustain it for long-term prosperity.

I've told you what I think. Now I urge you to express your views, and to do so during the next few weeks. And when you have done that, I would also ask you to pass this letter, or your own, to other members of the community in which you function, and ask them to express their views to government as well. This is a chance to make sure our future prosperity has a sound foundation — a chance that we can't afford to miss.

Yours sincerely,

Angus A. Bruneau

From the June Council Meeting ...

Council made no decision on the suspension of competitions (see editorial, *Contact*, Summer 2001). Therefore, all competitions will continue as scheduled.

NSERC eBusiness: At Home on the Web

affaires ebusiness

This summer, we launched the eBusiness Project Web site, where researchers, students, university administrators and the public can go to find out about the project and how it's progressing. A sub-site of our main corporate site, it's accessible by clicking on the eBusiness logo on our home page.

"We're very excited about the launch of the Web site," says Christiane Villemure, Director of the eBusiness Project. "It's an opportunity to connect with our clients and make sure the eBusiness Project is everything we all want it to be."

What you'll find on site:

- News — the latest news from the eBusiness Project
- Progress reports
- Comments from researchers, students etc.
- Success stories
- Frequently asked questions
- Who's who at the eBusiness Project office
- How to contact the eBusiness Project office
- Links to eServices* already available

Take a few minutes to visit the site and, if you have thoughts or feedback for us, click on the "comments" button and send us your input.

Visit the eBusiness Web site at www.nserc.ca/e/index_e.htm.

***2001 Literature and Forms Online**
Speaking of eServices, the 2001 NSERC program literature, including guides** for professors and students and fellows, plus our grant application forms are now available online. You can access them directly from the NSERC corporate Web site, www.nserc.ca, or from the eBusiness site, www.nserc.ca/e/index_e.htm.

****Program Guides for Professors, and for Students and Fellows**
There are a number of important changes in the guides this year, so please make sure you are using the new ones. And remember that program guides are no longer available in print form, only electronically. Click on the Program Guide title on our home page to see the most up-to-date version.

Protecting Flora and Fauna…

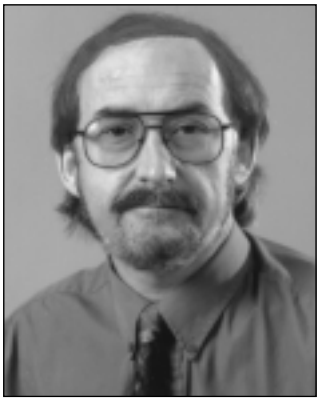
The new NSERC-Produits forestiers Anticosti Industrial Research Chair was recently inaugurated at Université Laval. NSERC and Produits forestiers Anticosti inc. will each contribute approximately $1.25 million over five years towards the Chair's research program, which is aimed at ensuring the effective, sustainable management of Anticosti Island's forests while also taking into account the impact of wildlife (deer overpopulations, for example) on these forests. The ministère des Ressources naturelles du Québec will contribute human resources.

Marc Robitaille

Shown at the inauguration ceremony are (from left to right): Mr. Marc Ledoux, Associate Deputy Minister, ministère des Ressources naturelles du Québec; Mr. Richard Bélanger, Chairman of the Board of Produits forestiers Anticosti; Professor Jean Huot, Chairholder; Mr. Claude Drouin, Member of Parliament for La Beauce; Mr. François Tavenas, Rector of Université Laval; and Dr. Tom Brzustowski, President of NSERC.

Molecular "Farmer" Leads the Way

When Dr. Maurice Moloney became NSERC/ Dow AgroSciences Chair of Plant Biotechnology in 1994, he wanted to assure Canada's place as a world leader in the exploitation of oilseed crops.



Dr. Maurice Moloney

With the help of his research team of technicians, postdoctoral fellows, and graduate students, Dr. Moloney found a simple, cost-effective technique to produce recombinant proteins in oilseeds. These proteins can be used in a variety of pharmaceutical and industrial applications, from treating illnesses and diseases in humans, to breaking down waste water in pulp mills. Using a technique called "molecular farming," Dr. Moloney discovered that by introducing DNA into cuttings of common oilseeds, he could even grow these proteins within the seeds themselves.

Dr. Moloney's research at the University of Calgary resulted in the establishment of SemBioSys Genetics Inc., a Calgary biotechnology company. Firms like Dow AgroSciences Canada, Bay City Capital, Ventures West, The Royal Bank and The Business Development Bank of Canada have invested over $20 million, and now SemBioSys has increased its research staff from 20 to over 50, with potential for more job creation as the technology develops and products are brought to market. SemBioSys' research has led to the filing of six patent families world-wide. Dr. Moloney has also been awarded a second five-year term as the NSERC/Dow AgroSciences Chair.

As Chief Scientific Officer for SemBioSys Genetics Inc., Dr. Moloney will be taking a two-year sabbatical from his Chair to devote time to the launch of SemBioSys' first commercial product, expected in 2002.

"SemBioSys is a great example of excellent co-operation between university research and industry," says Dr. Moloney. "Canada has the scientific and business talent to be a world leader in this area."

For more information about NSERC's IRC program, including application, review procedures and selection criteria, please visit the NSERC Web site at www.nserc.ca/guide/c1_e.htm.

Science Promoters Rewarded

The winners of this year's Michael Smith Awards are:

- **Marie MacBeath**, founder, director and volunteer at Science East since 1994. For many years, Marie has turned her Long's Creek home into a live-in summer camp where 9-12 year-olds enjoy a one-week program of hands-on experiments, as well as environmental and stargazing activities.
- **Bob McDonald**, host of CBC radio's *Quirks and Quarks* and science correspondent for CBC TV's *The National*. For 25 years, Bob McDonald has been an entertaining and energetic advocate of science, a producer of documentaries and educational videos, a writer of newspaper and magazine articles, and a presenter to school children.
- **Les Scientifines**, which, since 1988, has been promoting science to young girls between 9 and 12 years old who live in underprivileged areas of Montreal, by giving them free access to daily scientific activities after school. The workshops focus on chemistry, physics, biology, mathematics, and new information and communications technologies.
- **Scientists in School**, a non-profit organization that brings enthusiastic scientists into elementary classrooms; the 70-plus programs they bring with them have hooked hundreds of youngsters on science for life. Founded in 1989, this diverse program has expanded from an initial 40 classrooms to 5,400.
- **YES Mag**, which began publishing in Victoria, B.C. in 1996. In five years, its subscription list has increased more than fivefold to 16,000 readers. The magazine offers readers, aged 8 to 14, a high quality, easy-to-read Canadian perspective on science, technology and engineering.

Named in honour of Canadian Nobel Laureate Michael Smith, the award goes to individuals and organizations who have made exceptional contributions to the promotion of science. Individual winners receive an award of $5,000 and winning organizations are awarded $10,000 to further science promotion activities. Winners also receive a medal bearing Dr. Smith's likeness.

NSERC gratefully acknowledges the $250 donation made by the Canadian Association of Special Libraries and Information Services (CASLIS) to the Michael Smith Awards program.

Since Michael Smith himself gave generously to the people of Canada and the world, using his time, energy and prize money to reach out to audiences with his message about the importance of science to everyone's life, we are pleased to accept donations from individuals and organizations that we can use to further his work.

McMaster's Dr. Henry Schwarcz: Jack of All Trades, Doctor of Geology

What's the common thread connecting geology, geochemistry, medicine, archaeology, anthropology, paleontology, climatology, ichthyology and seismology? It's not the obvious: that they're all the study of something. Instead, it's the short list of fields that McMaster University Professor Emeritus Dr. Henry Schwarcz has touched throughout his unique 25-year career as an interdisciplinary researcher.

And just how did this geologist/geochemist morph into a prodigious multi-tasker? He chalks it up to a liberal arts education before he became interested in science — and a rather ordinary moment at home.

"My wife asked me if I could talk about anything more interesting than rocks," says Dr. Schwarcz. "So I started to take an interest in archaeology and found out my background in dating samples was quite useful in that field. After that, I kept finding people in different fields who had problems I could help solve with my expertise."

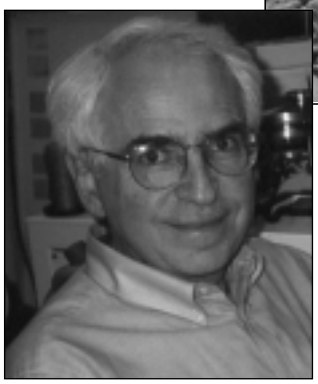
Thriving in diversity

Once he embarked on this path, there was no turning back — and no shortage of collaborations over the years. Currently, Dr. Schwarcz's expertise is at work in at least five wide-ranging areas. Some of this research is funded by NSERC's Grants Selection Committee for Interdisciplinary Research (GSC 21) (see sidebar).

The farthest away from his usual studies is a medical research project that uses a new isotope to determine the cell mass and track cell growth of premature infants. The technology may also have future applications in research on people with wasting diseases, such as AIDS, and even astronauts, who lose cell mass in space.

In archaeology, Dr. Schwarcz is involved in projects in southern Spain and Egypt, among others. For the project in Spain, he is using advanced techniques to date a site where humans may first have appeared in Europe some 1.5 million years ago. In Egypt, he is studying an area of the country's western desert to determine when people lived there and the climatic changes that have taken place since.

In Southern Spain, McMaster University's Dr. Henry Schwarcz works with researchers to date a site using a new technique called electron spin resonance. Although primarily a paleontological site, the area appears to be the site where humans first appeared in Europe some 1.5 million years ago.



Dr. Henry Schwarcz

Moving to anthropology, Dr. Schwarcz is using isotopic analysis to study human bones and teeth from a Roman cemetery to determine what people ate in the area from 100 to 200 A.D.

In seismology, Dr. Schwarcz is dating the ground-up dust along certain fault lines to determine the last time an earthquake occurred there. This could help evaluate the risk of renewed activity on faults in California, Korea, Switzerland and elsewhere.

And finally in ichthyology, Dr. Schwarcz is studying the ear bones — the otoliths — of northern cod in Atlantic Canada. By studying the buildup of sequential layers in the otoliths, researchers can trace the environmental

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Interdisciplinary research pushes the boundaries

Increasingly, research requires expertise, methodologies, equipment and resources that go beyond the knowledge and means of one researcher. Many new and emerging advances in science and engineering occur rapidly when people with vastly different experience come together and share their expertise.

"A lot of the latest innovations in science and technology are occurring at the fringes of traditional disciplines because that's where new ideas come into play," says Nigel Lloyd, NSERC's Director General, Research Grants and Scholarships. "And that's one of the reasons NSERC created the Advisory Group on Interdisciplinary Research (AGIR) — to help us determine how we can better support interdisciplinary research. But this is just one step in our evolution; NSERC is interested in excellent science wherever it occurs."

In addition, NSERC's Grants Selection Committee for Interdisciplinary Research (GSC 21), looks at proposals that cut across several disciplines. Committee members come from diverse backgrounds and rely heavily on experts in many fields to ensure that proposals are evaluated fairly.

"It's a fascinating committee to be on," says Dr. Louise Nelson, a Professor of Applied Microbiology and Food Sciences at the University of Saskatchewan and current Chair of GSC 21. "We see a whole spectrum of collaborations, ranging from medicine and engineering to math and biology. And as science moves forward, these innovative partnerships are necessary to make real progress."

NSERC's Scholarships and Fellowships:
New Survey Reveals Big Return on Investment

(Editor's note: This is the sequel to the article in the Summer 2001 issue of Contact *illustrating the value of NSERC's Scholarships and Fellowships programs based on surveys of former award holders. The earlier article featured the results of the survey of Undergraduate Student Research Award recipients.)*

Postgraduate Scholarships Program (PGS)

Objective
- To provide the financial support that will enable students to pursue Master's and Doctoral degrees in S&T — enabling them to go on to occupy research, teaching, engineering, management, and executive jobs, or to become the S&T entrepreneurs who found new S&T companies.

Support level
- $53 million annually to students
- $83 million annually to university researchers who employ students on their research projects

Scope
- supports 3,200 students annually
- supports 4,500 full-time equivalent students who work on university research projects

Postdoctoral Fellowships (PDF) Program

Objective
- To secure a supply of highly qualified Canadians with leading-edge scientific and research skills for Canadian industry, government and universities

Support level
- $13 million annually to students
- $29 million annually to university research investigators who hire PDFs for specific projects

Scope
- 450 student recipients annually
- 800 full-time equivalent PDFs who work on university research projects.

McMaster's Dr. Henry Schwarcz,
continued from page 5

conditions experienced by the cod and potentially learn why their numbers declined so dramatically in the early 1990s.

Thinking outside the box

"There is no question that problems arise in fields in which the tools to solve them do not exist," says Dr. Schwarcz. "I think of my knowledge and expertise as a 'bag of tools' I can use in other fields. But interdisciplinary research is not just about bringing technology from one field to another. It's more of a way of thinking, a different approach, a conceptual synergy."

"Once you liberate yourself from thinking in boxes, you open yourself up to making so many new discoveries," says Dr. Schwarcz. "Consider a Lego set. If you only have two kinds of blocks, you are very limited in what you can put together. But if you have 100 different blocks, you have almost unlimited potential."

Postgraduate Scholarships Program

NSERC focused its survey of former PGS recipients on those who had completed participation nine years ago. The survey sought to learn:
- Where and in what capacity the former fellowship holders are now employed.
- Whether NSERC funding played a significant role in their decision to pursue graduate studies.
- How successful they were in obtaining graduate degrees.

How well are these graduates doing after nine years? PGS "graduates" experience far less unemployment (1.7%) than the national norm (8%), as 92% of them have found full-time employment. In addition, their annual income is 70% higher than that of their Canadian age cohorts.

Where are they working now?
- Nearly 65% are still engaged in R&D.
- Almost 28% teach, focusing on transmitting their skills and knowledge to up-and-coming researchers and others.
- The highest proportion (44%) work in industry — a significant change, since historically, Canadian industry has under-performed other countries in hiring researchers.

In looking back, PGS graduates said that the program played a major role in their professional development:
- 96% reported that their NSERC-supported graduate training was either "critical" (69%) or "beneficial" (27%) to their careers.
- Over 90% cited NSERC support as "moderately important" to "essential" in their decision to undertake or continue with their studies.

PGS recipients are also a persistent group when it comes to education. Compared with overall Canadian university dropout and non-completion rates, their 96% completion rate puts them well above the national average.

Postdoctoral Fellowships Program

Since most PDF recipients seek jobs in university research and teaching, the PDF program is a vital training ground for tomorrow's university research cadre. NSERC's survey reveals that the PDF program is critical to Canada's ability to meet our growing demand for advanced research capability in Canada.

Among the survey's findings:
- While a high proportion (59%) of NSERC PDFs train in foreign (mostly American) universities, over 67% eventually return to Canada for work.
- Seven years after their fellowship, 88% are still engaged in research.
- 73% of PDFs return to teach at universities.
- 90% cited NSERC funding as "moderately important to essential" to their decision to remain in a university research environment.
- 88% reported that NSERC funding was at least moderately important to their ability to continue with their research in an academic environment. A full 50% described NSERC support as "essential."

Help Me – I Don't Understand!

Scientists and engineers need to employ language that is as precise as their thinking. It has to cover every nuance of meaning, all in meticulously avoiding any potential misunderstanding or ambiguity.

Such fine-tuned communication habits automatically kick in, particularly when they are talking about their research. However, this is a language that doesn't work with the public. Here is an audience that works to very different criteria when reaching for an understanding that will satisfy it and meet its intellectual needs.

You will remember from your NSERC applications that you are asked to submit a summary of your work for public release. 'Use plain language' reads the accompanying request in brackets. Unfortunately, many summaries fall short of the target.

The trick is to imagine that you are addressing a non-scientist, such as myself. (I fancy that NSERC's logic in hiring me was 'if he can be made to understand it, then the rest of the world stands a chance…') I have found that once I explain that I am not scientific, that I am a graduate in comparative religions, the researchers on the other end of the phone start bravely heading into new communication territory.

And, God bless 'em, it works. We've had some super results that made it into the media simply because the researchers gave me the means to tell the story to journalists in plain language.

Francis Lionnet

If you really want to hit the bullseye, imagine that you are explaining your work to a school kid. Three professors whom I recently complimented on the *'vox populi'* clarity of their summaries gave me a wonderful insight. Each told me that he had learned to do it as a result of being confronted with a classroom of kids who had no problem informing him that they didn't know what on earth he was talking about. If you have children, try it out on them. It's a sure way of finding out!

Remember that nothing communicates more effectively than analogy. The enduring power of fables and parables bears ample witness to its ability to take people into complex ideas.

Always reach for technology that people are familiar with — cars, computers, washing machines. After all, it's the references we hold in common that unite us.

Or, if you want to try another route, call me at (613) 992-9001. I'm compulsively curious not only about what researchers do, but also about the passion that keeps them engaged in their work.

So why bother? First of all, the summaries you provide for public release are the main tools available to us for getting you publicity, so *we need you to give us something that we can effectively work with.*

Secondly, public communication skills are now a 'must' for science and engineering researchers. There is a new market hungry for scientific information and more and more media are adding full-time science reporters to their staff. Only this month we have learned that CTV are recruiting a crop of science specialists.

So each one of you has two audiences, your peers and the public. And there are great rewards to be gained from reaching both.

Francis Lionnet
NSERC Newsbureau

Conference a Must for Those in Research, Development or Policy

Meeting Canada's R&D Challenge:
Getting from 15th to 5th in Global R&D. November 13, 2001, Holiday Inn Crowne Plaza, Ottawa.

This first *RE$EARCH MONEY* conference will bring together some of Canada's most influential thinkers to debate how Canada can improve its R&D performance over the next decade.

According to Jeff Crelinsten, Publisher of *RE$EARCH MONEY*, "Participants will assess what the private sector, governments and academia must do to reach the federal government's ambitious target."

NSERC is a conference partner. Among the confirmed panelists are: Peter Harder, Deputy Minister, Industry Canada; Hélène Tremblay, President, Conseil de la science et de la technologie; Robert Giroux, President and CEO, Association of Universities and Colleges of Canada; Douglas Barber, Vice-chair, Ontario Science and Innovation Council; David Crane, Economics Editor, *Toronto Star*; and Tom Brzustowski, President, NSERC.

To register or to obtain more information, go to www.researchmoneyinc.com.

NSERC, CIHR and SSHRC Team Up

to Support Intellectual Property Management

NSERC has joined forces with CIHR and SSHRC in time to expand the Intellectual Property Management (IPM) Program for the 2001 competition. This new partnership will help accelerate the transfer of knowledge and technology from universities and hospitals for the benefit of all Canadians.

Launched by NSERC in 1996, the program provides funding to help universities (and now hospitals) better manage their intellectual property. It also promotes the professional development of intellectual property personnel — a critical task in today's competitive, knowledge-based global economy.

Activities eligible for funding include the recruitment, training and development of personnel, protecting and marketing intellectual property, conducting initial technology assessments and networking across institutions. The three funding agencies especially encourage proposals that link institutions and respond to a particular institutional, regional or local need.

2001 Competition deadline fast approaching

Proposals for funding must be submitted by the Vice-President, Research of a university or the appropriate senior administrator of a hospital (the lead institution in the case of joint proposals) and received by NSERC on or before **October 15, 2001**.

A selection panel with expertise in intellectual property management, marketing, commercialization and entrepreneurship will evaluate the applications on the quality of the proposal, the demonstrated need for resources and the potential to increase knowledge and technology transfer. Institutions are expected to share the costs of the proposed activities.

For a complete program description and application guidelines, please check the NSERC Web site at www.nserc.ca/guide/b6_e.htm.

Investments in Innovation

The **2001 Innovation Conference** will be held Monday, November 19, and Tuesday, November 20, 2001, at the Wyndham Hotel in Montreal. The theme of this year's conference is "Investing in Innovation." The conference will bring together leaders from industry, universities and government involved with innovation and investing in innovation.

A highlight of the conference will be the celebration of some very successful R&D partnerships at the **Synergy Awards Banquet** on the evening of November 20, 2001. Dr. Tom Brzustowski, President of NSERC, and Dr. Anne Golden, President of The Conference Board of Canada, will present the 2001 Synergy Awards for outstanding university-industry R&D collaboration.

To register for the conference or obtain a copy of the agenda, visit the Conference Board Web site: www.conferenceboard.ca or call 1-800-267-0666.

Newsbureau Working for You

As always, the NSERC Newsbureau continues to alert the media about NSERC issues and NSERC-funded researchers. Here are some examples of what we've been up to since the last time we reported to you.

Jack Terhune of the University of New Brunswick was featured in late March on *@discovery.ca* speaking about the vocalizations of seals. The University of Toronto's Darryl Gwynne, appearing on the same show in May, had host Jay Ingram visibly fascinated by his tales of gender wars and tactical food bribes among amorous insects.

Media interest in McGill's Dan Levitin and Dalhousie's John Connolly continues unabated. Psychologist Dan Levitin's earlier exposure in the *Globe and Mail* led to a March interview with BBC radio. In May, John Connolly was prominently featured in a *National Post* article followed by even bigger coverage in the *Globe and Mail* in June. The Dalhousie neuropsychologist was also interviewed by Maureen McTeer on the Internet Web TV.

Paleobiologist Jon Smol of the University of Alberta was featured on CBC's Radio Calgary, Radio Saskatchewan and Radio Whitehorse during mid-June. He was discussing his discovery that the prairies have always been drought lands and that their last two hundred years as fertile farmland are but brief exceptions to the rule. Also in June, his work made its way into a *Toronto Star* article on the prairies' ongoing dry spell.

Biologist Jean-Michel Weber of the University of Ottawa appeared on RDI International's *Émission Planète* on July 14 explaining his exploration of the ingenious mechanisms used by animals to achieve extraordinary feats of endurance. Dr. Weber expressed the hope that they will one day be duplicated in humans.

In August, the *Toronto Star* ran a story featuring the Canadian-built submersible ROPOS, and several researchers from Dalhousie and McMaster universities who are working on exploring and protecting the coral forests off Canada's east coast. These include Dalhousie's marine geologist and chief scientist Anna Metaxas and paleobiologist Dave Scott, and McMaster geologist Mike Risk.