

in **Focus**

FALL 2007



McGill

SCIENCE

edition



Spotlight on Green Science

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Mini-Science

This year, Dean **Martin Grant** launched a new initiative in the Faculty called Mini-Science. The lecture series follows the model of the highly popular Mini-Med, Mini-Law and Mini-Music programs introduced to McGill by **Kappy Flanders**, one of the University's most active volunteers. Designed to offer the public an insider's view of science, Mini-Science is an educational outreach program sponsored by the Faculty of Science. This year's program consisted of seven weekly public lectures on the The Brain. Some of McGill's top scientific minds, including professors **Dan Levitin**, **Jeffrey Mogil**, **Karim Nader**, **Barbara Sherwin**, **Joe Schwarcz**, **Paul Wiseman**, and Dr. **Alan Evans** of the



Montreal Neurological Institute, were among the presenters. Their talks were designed to enlighten, entertain and demystify cutting-edge research in an area of neuroscience. Topics explored were brain chemistry, the cognitive neuroscience of listening to music, how neurons work, the nature and nurture of pain, the neurological processes involved in fear and memory, the relationship between intelligence and estrogen and the structure and function of the living human brain. This year's Mini-Science lectures were enjoyed by a packed house of 300. Next year's series will explore Evolution and Ecology. Please check the Faculty of Science website in early 2008 for information on how to sign up.

Development, Alumni and University Relations Staff update in Science

The Faculty of Science is pleased to welcome two new Development, Alumni and University Relations staff members.

Jennifer Kambhampati is our new Development Associate. Jennifer is an experienced political advisor and analyst who has worked directly for elected officials in Texas and Los Angeles. She holds a Bachelor of Arts in History from Carleton College, Northfield, Minnesota and a Master of Public Affairs from The Lyndon Baines Johnson Presidential School of Public Affairs from the University of Texas at Austin.

Michael Woloschuk joined the Faculty as Communications Officer this summer. Michael is an experienced writer and investigative journalist with international experience that includes City University of Hong Kong and the corporate sector in Japan. He holds a BA and a Graduate Diploma in Journalism from Concordia University, Montreal.

The Faculty bids adieu to **Mae Jane Nam**, BA '05, who will be pursuing her studies in McGill's Faculty of Law, and to **Mark Shainblum**, who has moved to the University Relations Office as a research writer. We thank them both for their contributions to the Faculty of Science.

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On the cover:

The Science of Stewardship:

Biology Professor Dr. Lauren J.
Chapman cradles one of the
cichlids she studies.
Photo by Owen Egan

Dear Alumni and Friends,

These days, you can't open a newspaper or scan the Web without reading about global warming, carbon offsets and the Kyoto Protocol. The media and the public finally seem to be awakening to the challenges of climate change and environmental degradation that researchers have been talking about for a decade and longer.



Understandably, people on both sides of the issue have strong opinions about issues like global warming and sustainable development. Our primary concern at McGill is the hard underlying science and the answers that it provides, and this much is clear: the overwhelming preponderance of scientific evidence says that climate change is a real and growing phenomenon.

At the Faculty of Science we have been studying the natural world and humanity's effects upon it since the Faculty's precursor was founded by naturalist William Dawson more than 150 years ago. In the past decade alone, McGill biodiversity scientists have published a total of 34 articles in *Science* or *Nature*, the two top scientific journals in the world. Today, McGill is operating at the cutting edge of research into climate change, extreme weather, biodiversity, sustainable development, green chemistry, Earth systems science, and other green areas of international concern. We're breaking down disciplinary boundaries to look at how the Earth functions as a single, integrated system. McGill researchers regularly make dramatic and sometimes frightening discoveries, such as the study co-authored by Dr. Bruno Tremblay of the Department of Atmospheric and Oceanic Sciences, which suggests that, unless we significantly reduce greenhouse gas emissions fast, the Arctic Ocean will be virtually ice-free by the summer of 2040.

We are working hard to educate and inform the public as well. Our inaugural 2006 Lorne Trotter Public Science Symposium was on Climate Change and Energy. Moreover, we understand that the public looks to science not only to understand and frame these issues, but also to provide possible solutions. Dr. Chao-Jun (C.J.) Li and his colleagues in the Department of Chemistry are spearheading McGill's revolutionary Green Chemistry Initiative, which holds out the promise of detoxifying industrial chemistry and making plastics out of carbon dioxide instead of petrochemicals. Not only non-toxic and biodegradable, these plastics might also act as a carbon sink to help resolve global warming as well.

We are also currently the home faculty of the McGill School of Environment (MSE). The only institution of its kind in Canada, the MSE is a unique, inter-faculty school jointly founded and run by McGill's Faculties of Science, Arts and Agricultural and Environmental Sciences. Founded on the principle that there are no simple solutions to complex environmental problems, MSE programs bridge the boundaries between disciplines. Each approaches the environment from many dimensions—never from a single point of view. Students become schooled in viewing environmental issues through multiple lenses.

Of course, none of this would be possible without the generous support of our alumni, benefactors and volunteers. Without your support—moral as well as financial—McGill would not be the green leader it is today. But we're only at the beginning of the story, not the end, and we'll need your continued faith and support as never before to help understand, face and solve the environmental and technological challenges facing us in the 21st century. I know we can count on you.

Martin Grant

The Faculty makes it easy for you to keep in touch electronically. You can find alumni news at the Science Alumni and Friends website, www.mcgill.ca/sdo. Sign up for a quarterly electronic newsletter and periodic event announcements by sending an email with your name, degree and year of graduation to reply.alumni@mcgill.ca.

B I O D I V E R S I T Y ' S B I G P I C T U R E

Help for the Coming Crisis

Look in any medicine cabinet and you'll find evidence of the importance of biodiversity on our lives. In Canada, more than 40 per cent of the drugs prescribed by doctors rely on active ingredients from organisms found in nature, which are only later replicated in labs. It is impossible to overestimate the significance of a sound and diverse ecology on the health industry, which uses more than 20,000 different plants species for medicinal purposes.

Indeed, most anti-cancer drugs being explored are based on chemicals found in plants from tropical forests. In agriculture, a more diverse range of species means better, more efficient utilization of the soil's nutrients, and ultimately a greater production of biomass. On a large scale, diversity helps provide greater resistance to some types of diseases. Biodiversity plays a role in climate regulation and also improves the resistance of environments to storms. Ultimately, all ecosystems are dependent upon biodiversity for their balance and well-being.

And yet, the world is facing a significant change in this ecological balance, with far-reaching implications. Michel Loreau, professor of biology and holder of the Canada Research Chair in Theoretical Community and Ecosystem Ecology, issued a wake-up call last year in a *Nature* article in which he said "there is clear scientific evidence that we are today on the verge of a major biodiversity crisis." Loreau's piece, co-signed by 19 top international scientists, advocates the creation of an international biodiversity panel to advise policymakers on the complex challenges they confront in the coming years.

There is evidence that an acute loss of species is occurring right now. A decade ago, the extinction rate was estimated at 30,000 species each year, but most scientists believe that the pace has accelerated

‘ McGill has built what is arguably the top group in Canada, and certainly one of the top in North America. ’

GRAHAM BELL, JAMES MCGILL PROFESSOR IN THE DEPARTMENT OF BIOLOGY, ON MCGILL'S CUTTING EDGE BIODIVERSITY RESEARCH.

since—some putting the annual attrition at over 50,000. Currently, 12 per cent of bird species, 23 per cent of mammals, 25 per cent of conifers, and 32 per cent of amphibians are facing extinction. While we understand, at least in broad terms, how species are lost, we still know little about what these losses mean—or how biodiversity develops in the first place.

In recent years, the Faculty of Science has recruited many top teachers and researchers who are investigating these questions. "McGill has built what is arguably the top group in Canada, and certainly one of the top in North America," says Graham Bell, James McGill Professor in the Department of Biology and former director of the Redpath Museum. More than 20 biodiversity and conservation researchers are based in the Department of Biology and the Redpath, and another interdisciplinary group operates through the McGill School of Environment. All told, at least 40 faculty members, and many more graduate students, are carrying out work directly related to this area. That research is truly top calibre.

MCGILL'S GREEN GIANTS OF BIODIVERSITY



Ehab Abouheif, Assistant Professor of Biology and Canada Research Chair in Developmental Evolution, is involved in the study of the evolution of development. One of the most exciting discoveries to emerge from this field has been the realization that developmental regulatory genes, such as Hox genes, have been conserved across the animal kingdom.



Graham Bell, James McGill Professor in the Department of Biology, and former director of the Redpath Museum is the founding director of the Canadian Society for Ecology and Evolution, formed in 2006 to promote the study of evolution and ecology in Canada and to transfer knowledge from scientists to the public and to policy-makers.



Lauren Chapman, Professor of Biology and Canada Research Chair in Respiratory Ecology and Aquatic Conservation and associate scientist with the Wildlife Conservation Society, is committed to saving wildlife and wild lands through international conservation, education and the management of the world's largest system of urban wildlife parks.

From Evolution to Conservation

The relation between ecosystems and evolution has been discussed ever since a young Charles Darwin, ship's naturalist aboard HMS Beagle, noticed that Galapagos Islands finches included a diverse array of species with markedly different beaks. These morphological distinctions helped Darwin shape an idea that would become the theory of natural selection. Recently, however, scientists have discovered that



Andrew Hendry and finch

morphological change can also be slowed or even reversed. When McGill scientist Andrew Hendry, an associate professor at both the Redpath Museum and the Department of Biology, visited the

Galapagos Islands recently, he found another finch phenomenon. Differentiations among finches had shrunk as people rendered the Galapagos landscapes more homogenous.

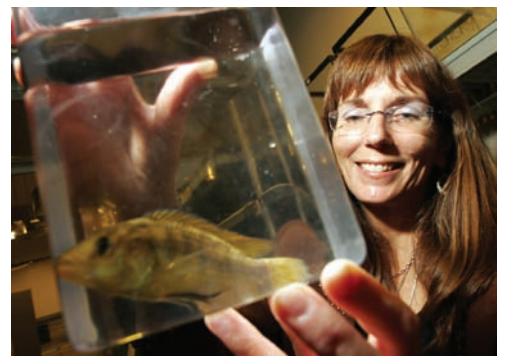
Researchers are just beginning to recognize that human influences are having an impact on evolution, even in the short term—an important factor for future conservation practices. “Integrating contemporary evolution with ecology, conservation and biodiversity—and studying how evolutionary processes can best inform biodiversity conservation—have become exploding areas,” says Hendry, whose 2003 article on the relationship between contemporary evolution and conservation biology, co-authored with two U.S.-based scientists, has since been cited in more than 100 other papers. The Hendry lab investigates factors that influence the evolution of biological diversity, including natural selection, gene flow, adaptation and reproductive isolation. “The study of how contemporary evolution affects conservation biology is on the verge of being a major area,” says Hendry. But while the field is very new, many McGill scientists are already involved, pushing research forward.

Return of the Cichlids

One of the best examples of the relationship between evolution and conservation is embedded in projects such as Lauren Chapman's study of ecosystem dynamics in Africa's Lake Victoria. When the Nile perch—a toothy predator that can reach over 100 kilograms—was introduced to Lake Victoria in the 1950s, it consumed many of the lake's native fish, including hundreds of species of small, versatile cichlids. Between 200 and 300 cichlid species were lost in one of the largest mass extinctions in recent years. Some, however, fled to swampy waters low in oxygen to remove themselves from the perch menu, and eventually, the perch population began to decline.

Cichlids—including some species that had been believed to be extinct—began to return from the low-oxygen papyrus swamps to Lake Victoria's more pleasant waters. But after generations of living in these stifling conditions, have these cichlids changed? Chapman's current research is investigating this possibility, comparing today's cichlids with others preserved in museum collections.

Another aspect of Chapman's work involves collaborating with African scientists and fisheries authorities to find an optimal balance of cichlids and Nile perch that would maintain ecosystem balance, while at the same time sustaining the livelihoods of local fishermen from Kenya, Tanzania and Uganda. Because, of course, human needs interact with biodiversity and conservation issues, we cannot separate ourselves from the equation. Indeed, biodiversity researchers seem almost inevitably to move into the world of policy and activism.



Lauren Chapman shows off a cichlid



Andrew Gonzalez, Associate Professor of Biology and Canada Research Chair in Biodiversity, is focused on researching the causes and consequences of biodiversity loss, with the hope of gaining a better understanding of what it will take to slow extinction and mitigate its effects.



Michel Loreau, Professor of Biology and Canada Research Chair in Theoretical Ecology, is scientific director of Diversitas, an international organization that coordinates interdisciplinary biodiversity research, and is also concerned with investigating questions of biosustainability and human interactions with ecosystems.



Garry Peterson, Canada Research Chair in Social-Ecological Modelling and assistant professor in both the Department of Geography and the McGill School of Environment, was a coordinating lead author on the Millennium Ecosystem Assessment report, published in 2005, that assessed the consequences of ecosystem change for human well being.

THINKING Outside the BOX on *environmental* issues

Many environmental questions confronting us today transcend the boundaries of academic disciplines. Issues such as climate change, global warming, biodiversity and water management demand the knowledge and insights of scientists, philosophers, economists, engineers and legal experts. As a result, universities are looking to develop multidisciplinary solutions to these issues. McGill's response to the challenge is the McGill School of Environment (MSE), coordinated by the Faculties of Science, Arts, and Agricultural and Environmental Sciences.



Nigel Roulet, MSE Director

"The MSE brings a truly interdisciplinary approach to environmental questions, uniting scientific research with social and political analysis," says MSE Director Nigel Roulet, also a geography professor who explores the role of peatland ecosystems in the carbon exchange systems that form a crucial element in climate change models. "The MSE definitely stimulates research across disciplines. When people coming from different areas but with similar interests regularly run into one another, synergy begins to develop."

Interdisciplinary research poses its own challenges: for instance, even within the sciences, professional languages vary greatly so that chemists, biologists and geographers considering a common problem will draw on different key concepts and terms. The problem is only enhanced when economists, engineers, philosophers and anthropologists enter the picture. But at the same time, the format prompts researchers from across fields to learn how to work together.

"Issues like biodiversity loss and climate change are similar in that they are global phenomena, and individual countries cannot deal with them alone. They cross boundaries."

The MSE is now considering offering a graduate program that would involve research-based degrees at the master's and doctoral levels, focusing on those areas of the environment not served by programs elsewhere in the University. "We don't have a coordinated effort on things like environmental politics or policies and the notion of sustainability," says Roulet. "We need to think about how society is structured in a way that would address fundamental environmental questions. For instance, how do we deal with biodiversity in places where people are struggling to exist, where people may need to harvest certain species to survive? It's not an intellectual discussion for these people, but concerns their livelihood. Major social, political and economic issues also play a role in strategies to preserve biological resources, and we need to learn how to address questions of equity and social justice, which are not scientific questions but remain fundamental to the application of good science." The MSE is also exploring ways to transfer knowledge about these scientific and social issues to the broader public, and to prompt discussion at all levels on initiatives that can help to address them. "We spend a tremendous amount of time trying to get the message out to the public," says Roulet. "Education is a lifelong venture."

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“ Issues like biodiversity loss and climate change are similar in that they are global phenomena, and individual countries cannot deal with them alone. They cross boundaries. ”

NIGEL ROULET,
DIRECTOR, MCGILL SCHOOL OF ENVIRONMENT

Multidisciplinary Standout

The McGill School of Environment (MSE) study programs are truly cross-disciplinary, with each program approaching the environment from many dimensions and never from a single point of view. Among the many members and associate members who bring a wealth of experience to the MSE, Parisa Ariya stands out. An associate professor with Chemistry and Atmospheric and Oceanic Sciences, her research interests include the impact of bioaerosols on the chemistry and physics of the atmosphere. The Ariya Atmospheric and Interfacial Chemistry Research Group is focused on understanding the chemical transformation of ozone precursors, photo-oxidants, heavy metal and bioorganic toxicants, and their implications in climate change.



Parisa Ariya

Exploring Biodiversity Locally

Yet another batch of students enjoy a unique learning experience at McGill's Gault Nature Reserve. The 10-square-kilometre area, which hosts a variety of academic and outreach activities focused on biodiversity in and around Mont St. Hilaire in the Richelieu River Valley east of Montreal, was donated to McGill by

Brigadier Andrew Hamilton Gault in 1958. The reserve is an important venue for training and research, and plays host to some 12 classes from three universities using the reserve and more than 20 ongoing research projects involving up to 20 research scientists. About 20 undergraduate assistants and graduate students live and work at the reserve in summers. "The entire complex has wireless Internet, which means full access to McGill's electronic library," says Gault Nature

Reserve director and Faculty of Biology professor Martin J. Lechowicz. "A student can see something that day in the forest and Google it at night to read more. What better place to learn about biodiversity and then come back and talk about it?"

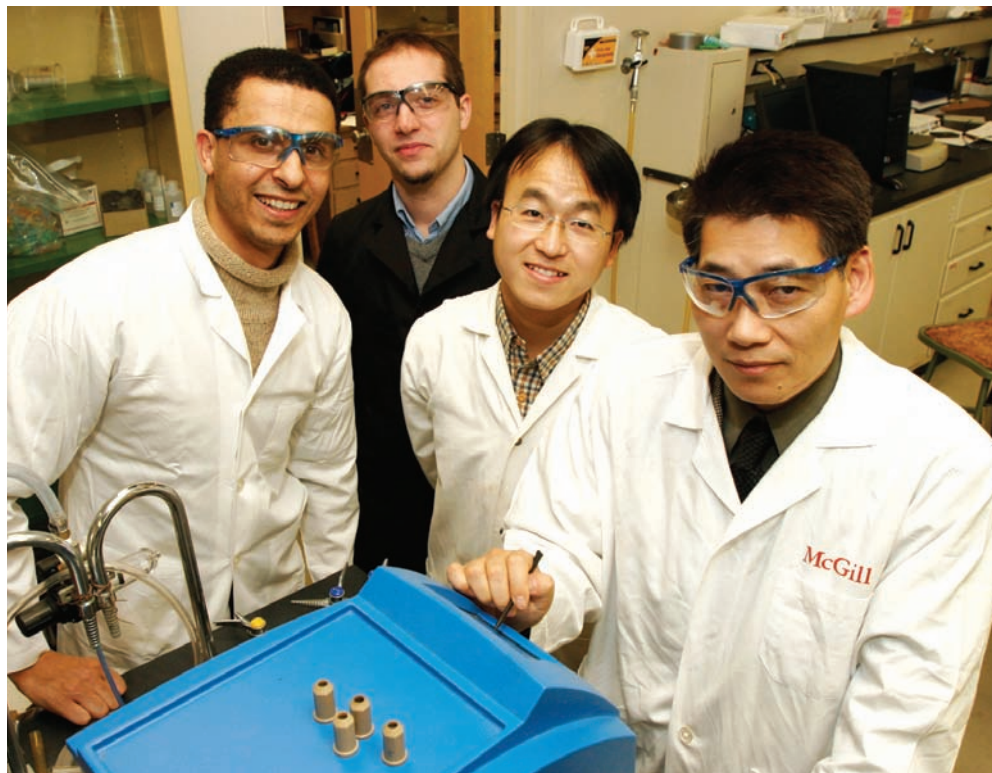


Students on the steps of the Gault Nature Reserve chalets, the main venue for resident classes

The Greening of Industrial Chemistry

A recent study in *The Lancet* warns that exposure to industrial chemicals may underlie a worldwide “silent pandemic” of childhood brain disorders such as autism, while other studies point to increasing contamination of ground water with toxic organic compounds that will last for centuries. The problem is that most raw

replace traditional practices that rely upon non-renewable petrochemicals and toxic organic solvents, including a recently discovered method to replace toxic organic solvents in many chemical reactions with water—something that would have been unthinkable even 15 years ago.



From left: Grad student Rachid Skouta and postdoctoral fellows Sarim Dastgir and Jianqing Feng in the lab with C.J. Li

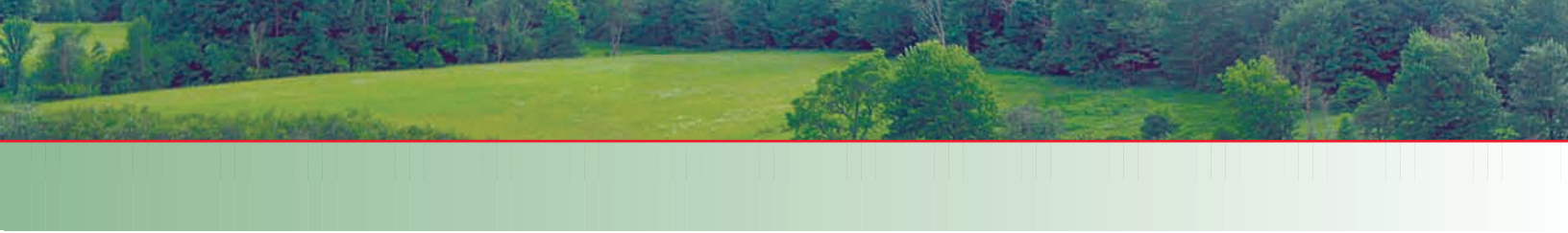
industrial chemicals are petroleum-based, and the vast majority of chemical reactions are catalyzed with toxic organic solvents.

Chao-Jun (C.J.) Li, PhD'92, Canada Research Chair in Green Chemistry and one of the pre-eminent researchers in the field, has recently developed possible short-term solutions to the waste commonly developed by these chemical reactions. His breakthroughs

“People have rarely looked at using water in organic chemistry at all,” says Li. “I don’t know why—perhaps due to a misperception. Some industries are still using chemical reactions that were discovered more than a century ago.” Using water as a solvent not only vastly reduces toxic waste products, he explains, it actually makes the processes far more efficient, and thus very interesting to industry from an economic standpoint.

Dr. Li’s second important discovery is a new process that he predicts will soon make it possible to create polymer plastics from carbon dioxide. This has multiple commercial and environmental benefits, not the least of which is the elimination of petrochemicals and toxic solvents from the plastics-making process. It also has huge implications for that other environmental bogeyman, global warming. “Some people want to bury waste carbon dioxide to reduce its greenhouse effects, but it’s far

more efficient to turn it into something useful instead. This new plastic has extremely good properties, and another big advantage—it’s biodegradable. If people throw it out, it decomposes and becomes carbon dioxide again. Of course, it’s better to recycle it, but if it does get thrown out, it’s carbon dioxide neutral, meaning it doesn’t add any new carbon dioxide to the environment.”



A Rich Tradition of Green

McGill's move to the forefront of green chemistry began during the tenure of Tak-Hang (Bill) Chan, now an emeritus professor of chemistry. Widely credited as the father of green chemistry research at McGill, Chan says he saw the writing on the wall for organic solvent-based chemistry as early as 1989, with the signing of the Montreal Protocol on Substances That Deplete the Ozone Layer. "It was actually the first international agreement that controlled the release of any kind of chemical into the environment," he says. "This made it clear to me that releasing volatile organic chemicals into the atmosphere would not be possible in the long run. One possible replacement that occurred to me was water. It's very interesting, because water is so commonly available, and yet as chemists we don't normally use it as a solvent."



Tak-Hang (Bill) Chan

McGill is now a global green chemistry leader, the core institution of Canada's Green Chemistry Network, and a magnet to researchers the world over. There are eight faculty members involved in green chemistry at McGill, including Professors Bruce Arndtsen, Karine Auclair, Nicolas Moitessier and Marcus Lindström, who was recently recruited from Sweden's Lund University. Dr. Audrey Moores, who joined McGill in January 2007 after completing her postdoctoral studies at Yale University, is the most recent member of the green team. This group of researchers has already made its mark in green chemistry by discovering new catalysts, new methods to screen molecules for biological activity, and new ways to perform reactions in the greenest of all solvents, water.

Making Biofuel from Gold

Bruce Lennox, Chair of the Department of Chemistry, whose primary field is nanomaterials, credits his green chemistry colleagues for creating an environment which encouraged him to explore other possible applications of his existing research. He discovered that gold nanoparticles, which he was applying primarily to biomedical problems, also act as an excellent catalyst for creating biofuel from methanol or wood alcohol. This has tremendous implications for the creation of methanol-based fuel cells, and for the struggling Quebec forestry sector which is looking for new markets for its products.

While new fuel cells and plastics will ultimately give consumers more environmentally friendly choices, McGill's green team is less focused on the end result than the means to get there. Refining chemical processes to produce less harmful waste from the get-go is a huge step towards reducing future toxic clean-up problems—and that's green chemistry's ultimate goal.

"Preventing a problem," notes Lennox, "is far more satisfactory than trying to fix one."



Bruce Lennox takes a break in the lab

McGill Launches Canada's First Earth System Science Program

THE



EARTH

Three departments in McGill's Faculty of Science made history in September 2007 when the first integrated Earth System Science (ESS) program in Canada was launched. A joint initiative of McGill's departments of Atmospheric and Oceanic Sciences, Earth and Planetary Sciences and Geography, the ESS program is a unique experiment in interdisciplinary education and research and puts McGill squarely at the forefront of developments in this vital area. McGill is only one of a handful of institutions worldwide to have established ESS programs.

Traditionally, the three departments have been separated by disciplinary boundaries: Geography is concerned with the surface of the Earth and the role of its human occupants, Earth and Planetary Sciences with the Earth's interior, and Atmospheric and Oceanic Sciences with the atmosphere and oceans. "The neat distinctions between these fields are not, however, as clear as they once were," explains Professor John Stix, chair of the Department of Earth and Planetary Sciences. "ESS has emerged as a consequence of research in one field becoming increasingly dependent on research in another, and of course, humanity has become an important component of the overall system."

Professor Tim Moore, chair of the Department of Geography, explained that ESS links the disciplines. "It is concerned with the complex interactions at their boundaries," says Moore. "It treats the Earth as a single integrated system and in that respect represents one stage in evolution of the three fields. From the student's point of view, the ESS program will complement the traditional departmental offerings with a synthetic, holistic approach that encompasses the whole planet."

The increase in computing power over the last decade has made it much more practical to model these complex relations, explains

Professor John Gyakum, chair of the Department of Atmospheric and Oceanic Sciences. "Earth Systems Science is, however, the result of the intellectual evolution of the fields that make it up. Scientists in these fields have developed a reasonably solid understanding of the pieces of the puzzle that is the overall Earth system. Now they are striving to see how to fit these pieces together to make the whole picture."

The Earth System Science program was deliberately created to foster a strong sense of community and interdisciplinary respect for the traditions of the three established departments, as opposed to generating a new, distinct department. ESS is largely run by a small joint committee of the three departments, with only the absolute minimum necessary organizational structures.



Professor Tim Moore

To date, the program does not even have a separate director and there are no immediate plans to create such a position. This lean structure also serves to direct most of the program's resources to research and teaching, say the three department chairs.

ESS has defined six interdisciplinary "grand challenges" related to a fundamental scientific problem, the understanding of which is crucial to humanity's prosperity, safety and very survival. These grand challenges include global cycles, energy and resources,

climate variability and change, land use and land cover change, Earth hazards and Earth-atmosphere observation, monitoring, analysis and prediction.

More information is available on the ESS website at www.ess.mcgill.ca

Meet Earth System Science's New Faculty

McGill has hired six outstanding new faculty members, two in each participating department, to teach and conduct research in Earth System Science. They are all leaders in their respective fields, and three hold Canada Research Chairs. They join approximately 60 current faculty members in the three participating departments (plus some professors from Biology and the McGill School of Environment) who are also involved in the ESS program. The six new ESS professors are:

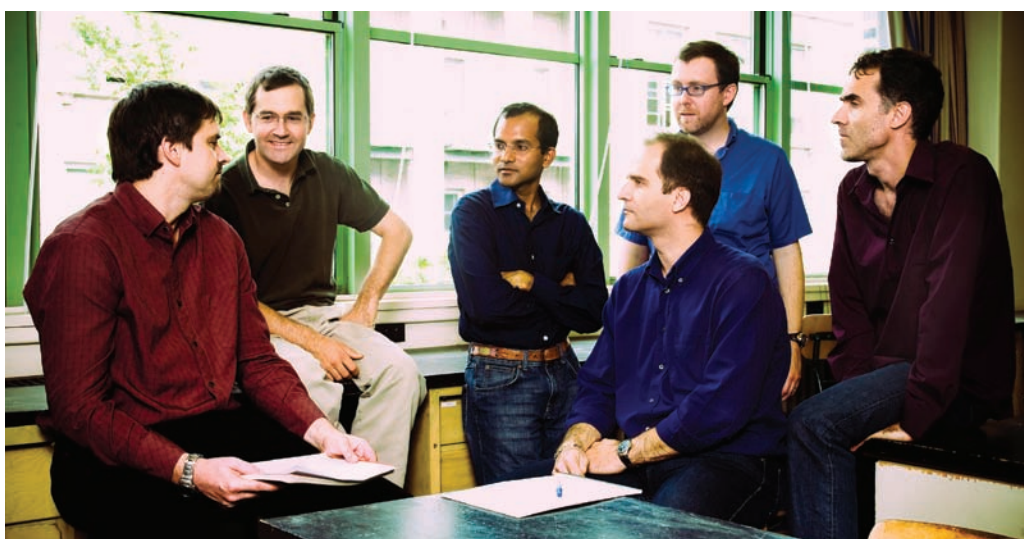
Pavlos Kollias, Assistant Professor in Atmospheric and Oceanic Science and Canada Research Chair in Radar Applications for Weather and Climate Research, brings a wealth of experience in such research areas as radar meteorology and cloud physics.

Bernhard Lehner, Assistant Professor of Global Hydrology and Climatology in the Department of Geography and Earth System Science Undergraduate Advisor, focuses his research on large basin, continental and global-scale modeling of the terrestrial water cycle.

Jeffrey MacKenzie, Assistant Professor in Department of Earth and Planetary Sciences. MacKenzie's research interests include the impact of climate change on hydrologic systems.

Navin Ramankutty, Assistant Chair in the Department of Geography and Canada Research Chair in Land-Use and Land-Cover Change. Ramankutty's research interests lie in understanding land use activities.

Bruno Tremblay, Assistant Professor in the Department of Atmospheric and Oceanic Sciences, is interested in the high latitudes and their effect on global climate and climate change.



From left to right: Bernhard Lehner, Boswell Wing, Navin Ramankutty, Pavlos Kollias, Jeffrey MacKenzie and Bruno Tremblay

Boswell Wing, Assistant Professor in the Department of Earth and Planetary Sciences. Wing's research deals broadly with the geochemical interaction between the solid earth and its fluid envelope.

Six Heads are Better than One

Although Earth System Science's six new professors have yet to choose a common research interest, they've already developed a classroom teaching style that's sure to keep students excited.

This year, all six professors will teach, together as a group, a course titled *The Future of the World's Energy Resources*, which draws on the unique specialties of each.

"The research hasn't happened yet, but the teaching has already started as a collaborative effort," said Bernhard Lehner, Assistant Professor of Global Hydrology and Climatology in the Department of Geography and Earth System Science Undergraduate Advisor.

"All six of us will be in the same class at the same time, teaching the students," he explained. "It's unique, but it works. We tried it

last year with three professors and the students really enjoyed it. Because we come from different backgrounds, we don't always agree, so debates and discussions are bound to break out. The students like it when we don't all agree."

Lehner said that he's hopeful the ESS program will be a success because of the wide perspective in disciplines it covers. Lehner added that more importantly, students are attracted to the program because of its emphasis on the human impact on our planet.

"We cover big topics, and they all have to do with humans and how we live on Earth—we always want to maintain a strong human perspective as well," said Lehner.

The Just-Right Universe

January's second Lorne Trottier Public Science Symposium—A Cosmic Coincidence: Why is the Universe Just Right for Life?—brought together the world's foremost physicists to debate one of the most controversial topics in astrophysics: the anthropic principle. In a nutshell, the principle suggests that nature is the way it is simply because if it wasn't, we wouldn't be here to observe it.

Fundamental Concepts in Science at Arizona State University; and George Efstathiou, director of the Institute of Astronomy at Cambridge University.

Davies framed the debate—could the universe have been different? If so, why is it the way it is? Why is it fit for life? Anthropic reasoning sees the emergence of life as central to the structure of the

universe—which handily explains why the values of certain fundamental physical parameters are those that make life possible, especially given that they differ from the values obtained using traditional mathematical equations.

This led Efstathiou to question whether this was “an explanation, or an act of desperation.” Gross challenged the scientific nature of the debate: “Questions that are scientific are susceptible to observation, experimentation and calculation.” For him, resorting to

anthropic reasoning to answer questions that science can't is dangerous. Susskind, more open to the anthropic principle, conceded that at this point in history “there is no real controversy, there are only questions,” but made sure to remind Gross that “all great ideas are always dangerous to somebody.”

A very brief glimpse of what was a truly fascinating discussion, which blurred the lines between science, philosophy, and religion.



Leonard Susskind (far right) with Lorne Trottier (far left) and physics students Arhan Bezbor and Sugumi Kanno at a post-symposium book signing

Vicky Kaspi, moderator and holder of the Lorne Trottier Chair in Astrophysics and Cosmology in the Department of Physics, noted that the debate evokes “uncharacteristic emotional intensity” in scientists. Kaspi introduced the powerhouse panel: Leonard Susskind from Stanford University, widely regarded as the father of modern string theory; Nobel Laureate David Gross, director of the Kavli Institute for Theoretical Physics at the University of California at Santa Barbara; Paul Davies, director of Beyond: Center for

Trottermania!

What began as an attempt to bring some of the best minds of the world together for a rewarding exchange of ideas has been transformed into one of the most popular lecture series in McGill history.

The Second Lorne Trotter Public Science Symposium—A Cosmic Coincidence: Why is the Universe Just Right for Life?—attracted a capacity crowd of more than 650 in Leacock 132, and more than 150 at the designated overflow room. Unfortunately, many were turned away, including a busload of students from an out-of-town CEGEP, whose bus sadly arrived more than 30 minutes late.

The McGill website, which provided a live webcast of the panel debate, crashed after too many people attempted to log onto the site. Meanwhile, the live audience, composed largely of McGill faculty, students, staff and members of the public, eagerly began lining up before 4 pm to gain entry to the 5 pm debate.

While physics lectures typically draw capacity crowds, the particular topic of the symposium and the quality of its panel—which included Nobel laureate David Gross and Leonard Susskind, the father of modern string theory—attracted a much larger crowd than anticipated.

Trotter Symposium organizers recommend that those interested in attending the popular lectures in the future line up well in advance of the scheduled event to ensure admission to the debate.



Lorne Trotter poses a question to the panel

A Cosmic Coincidence: Why is the Universe Just Right for Life?

was the second annual Lorne Trotter Public Science Symposium. The inaugural symposium on climate change and energy was held in November 2005. The event is supported by



The Cosmic Coincidence panel, from left: Paul Davies, George Efstathiou, Victoria Kaspi and Leonard Susskind

the Trotter Family Foundation. Lorne Trotter, BEng'70, MEng'73, DSc'06, is a major benefactor of McGill University: last November, he established endowed chairs in Science and Engineering, with physics professor Vicky Kaspi named the first Lorne Trotter Chair in Astrophysics and Cosmology. The Lorne M. Trotter Building opened in 2003, its construction, in large part, having been made possible by Trotter's generosity.

For more information on the symposium and the anthropic principle debate, visit <http://www.physics.mcgill.ca/events/trotter-symposium>

Scholarships in Science: Supporting our Very Best

The Faculty of Science would like to thank Michael Chan, BSc'72 and Robert Wilson, BSc'71 for establishing endowed scholarships. Michael Chan endowed the **Michael and Lena Chan Scholarship in Science**, an award that recognizes two top students (one female and one male) in the Faculty. Robert Wilson endowed the **Robert Wilson Scholarship in Science**, a scholarship that supports two exceptional students enrolled in a BSc program.

On April 12, 2007, the Faculty of Science hosted its annual Undergraduate Awards Reception in celebration of academic excellence and philanthropy. This special event honours the achievements of scholarship and award recipients in the Faculty of Science, as well as the initiative and leadership role of the generous benefactors who have established scholarships and awards. More than 150 recipients and benefactors attended the event in the Redpath Museum.

Dean Martin Grant, David Findlay, BSc'65, Fan Jiang (recipient of the Science Class of 1965 Scholarship), Allan Chartrand, BSc'65 and Hudson Vipond, BSc'65 smile for the camera.



Caroline Desmarais and Roberto Bellini, BSc'02, with Jenna Edith Gale, the 2006-2007 recipient of the FMRC Bellini Family Scholarship.



David Matthews, BMUS'07, BSc'07, recipient of the Annette Hill Scholarship and McGill's newest Rhodes Scholar, addresses guests at the Undergraduate Awards Reception.



Science Faculty Advisory Board Member, Eleanor Nicholls, BA'70, PhD'94, with her mother, Eleanor Nicholls, BA'34, and Sarah Jane Adams, BSc'07, the 2006-2007 recipient of the Science Faculty Advisory Board Scholarship.



Arthur Lau, BArch'62 and Crystal Lau, BSc'62, MSc'64, with Matthew Daher, the 2006-2007 recipient of the Arthur and Crystal Lau Scholarship in Science.

A group photo of the 2006-2007 undergraduate awards and scholarship recipients and their benefactors.

Save the Date

Homecoming 2007 will take place October 18–21. Alumni who graduated in years ending with 2 or 7 will be celebrating special anniversaries and, as always, the festivities provide a great opportunity to meet with old friends on and off campus. Graduates may also enjoy a number of exciting activities: lectures, concerts, sporting events, Classes Without Quizzes, as well as reunion dinners and McGill's popular and entertaining Leacock Luncheon. This year, the faculties of Arts and of Science will host the Arts and Science Deans' Breakfast at the Faculty Club. Come and meet the deans and get the latest news on McGill's two largest faculties! The Faculty of Science also invites alumni to the Undergraduate Awards Conference keynote lecture at Moyse Hall. World-renowned environmental scholar Professor **Jonathan Foley** will speak on Living on a Shrinking Planet: Challenges and Opportunities for a Sustainable Future. For more information on Homecoming 2007 events, please contact Jennifer Kambhampati at jennifer.kambhampati@mcgill.ca or (514) 398-4607.



This year marks the 150th anniversary of the McGill Alumni Association. Find out more at www.alumni.mcgill.ca/sites/alumni150.

Kudos

On May 24, 2007 the McGill Alumni Association honoured Director of the Office for Science and Society Dr. **Joe Schwarcz**, BSc'69, PhD'74 with the Faculty Award for Excellence in Alumni Education. A founding member of the Office for Science and



Society, Dr. Schwarcz teaches a variety of courses with emphasis on health issues and on the application of chemistry to everyday life. He has made appearances on the Canadian Discovery Channel, TV Ontario, Global Television, CBC-TV, CTV-TV and is the

host of the Dr. Joe Show on Montreal's CJAD and Toronto's CFRB.

Four McGill researchers have been named 2007 recipients of the prestigious Sloan Research Fellowship, outperforming many top research-intensive U.S. universities, including Cornell, Johns Hopkins and Yale. Professors **Mathieu Blanchette**, **Aashish Clerk**, **Patrick Hayden**, BSc'98, and **Jacques Verstraete**, all of the Faculty of Science, will each receive two-year fellowships and a \$45,000 U.S. award. The Sloan Fellowships provide support and recognition to early-career scientists and scholars, often in their first appointments to university faculties, who are working to set up laboratories and establish independent research projects. For the second year in a row, McGill edged out the other Canadian schools honoured with Sloans. This year they are the University of British Columbia, with three

recipients, the University of Toronto, with two, and the University of Alberta, with one.

McGill Astrophysicist, **Vicky Kaspi**, BSc'89, is the 2006 winner of the prestigious Steacie Prize in the Natural Sciences, awarded annually to a young scientist or engineer for notable contributions to research in Canada. Prof. Kaspi, who holds the Lorne Trotter Chair in Astrophysics and Cosmology and the Canada Research Chair in Observational Astrophysics, is an internationally respected expert on neutron stars, the dense, fast-spinning remnants left after the collapse of more massive stars. In the summer of 2007 Professor Kaspi was also awarded the Rutherford Memorial Medal in Physics by the Royal Society of Canada. Established in memory of the great scientist and leader in nuclear research, Lord Rutherford of Nelson, the medal is awarded for outstanding research in any branch of physics and chemistry. "I'm truly honoured to be awarded this medal from the Royal Society," said Professor Kaspi. "It's particularly meaningful for me, being here at McGill, where Lord Rutherford himself did so much of his groundbreaking physics research."

July, 2007 Prof. **Hung Guo** of the Department of Physics and Prof. **Isztar I. Zawadzki** of the Department of Atmospheric and Oceanic Sciences were inducted into the Royal Society of Canada. Prof. Guo was recognized for his pioneering contributions to theoretical and computational modelling of quantum transport in nanoelectronic systems, and Prof. Zawadzki for exceptional and long-lasting contributions to the understanding of precipitation processes using radar measurements.

Faculty and Alumni News

> T.H. Clark Chair established

On March 22, 2007, the Faculty of Science hosted an exclusive event at Calgary's Petroleum Club in celebration of the establishment of the T. H. Clark Chair in

Sedimentary and Petroleum Geology. Top donors to the T. H. Clark Chair and other McGill friends in Calgary were invited to meet Dr. Michael Riedel, the first Chair holder. T.H. Clark was one of McGill's most revered professors, known for his fundamental contributions to sedimentary geology and paleontology.



In Calgary's Petroleum Club: Richard Walls, Carolina Walls, BSc'85, Emeritus Professor Eric Mountjoy, Uldis Upitis, Nancy Dentinger-Upitis, Professor Michael Riedel, and Dean Martin Grant.

Dr. Riedel is a distinguished scholar in the areas of geophysics, geochemistry and sedimentology, and his current research interests lie in

the carbon cycle and the impact of gas hydrate migration on climate change. Joan Clark, BA'50, daughter of T. H. Clark, also attended the event.

The Faculty of Science gratefully acknowledges Uldis Upitis, MSc'66, Richard Walls, PhD'78, Shell Canada and other donors for their significant gifts to the T. H. Clark Chair.

> Celebrating Philanthropy in New York

On January 30, 2007, Principal Heather Munroe-Blum announced a gift of \$3-million dollars from Anthony (Tony) Campbell, BSc'69, to endow the Robert Archibald and Catherine Louise Campbell Chair in Developmental Biology. The gift is a homage to Tony Campbell's parents



From left, Assistant Vice-Principal of Development and Director of Campaigns Marc Weinstein, Tony Campbell, Principal Heather Munroe-Blum and Dean Martin Grant at the Union League Club

and was motivated by Tony Campbell's interest in life sciences and his desire to give back to his Alma Mater in a significant way. The area of developmental biology explores abnormalities in normal growth and development, and strives to understand how these irregularities result in diseases like cancer. The Chair holder of the Robert Archibald and Catherine Louise Campbell Chair in Developmental Biology will conduct research in experimental organisms in order to understand fundamental causes of major human disorders and disease. Tony and his wife Deborah hosted the special event in New York's elegant Union League Club.

> McGill Alumni Honorary Life Membership Award



Fred Kriebel, a member of the Faculty's Advisory Board since 2000, and a grandson of Vernon K. Kriebel, MSc 1909, PhD 1913, received an honorary life membership from the McGill Alumni Association on May 24, for his support of and commitment to the Faculty of Science and McGill University.

Fred Kriebel receives the Honorary Life Membership Award from McGill Alumni Association Vice-President Dr. Bruce Earl Dobby, BSc'76, DDS'81.

> Mysak Graduate Fellowship Endowed

Before Stephen Mysak passed away on April 21st of this year, his son, Professor Lawrence Mysak gave his father a very special 100th birthday gift. Professor Mysak, director of the Department of Atmospheric and Oceanic Sciences' Earth System Modelling Group, endowed a fellowship in honour



From left: Dr. Lawrence Mysak, his wife Mary and his late father Stephen

of his father and in memory of his mother, Anastasia. The Stephen and Anastasia Mysak Graduate Fellowship in Atmospheric and Oceanic Sciences, with a value of \$15,000, will be awarded annually to a full-time graduate student in the Department of Atmospheric and Oceanic Sciences, based on merit. The Faculty hosted a reception with the I Medici de McGill Quintet and a video presentation featuring Stephen Mysak in celebration of the fellowship.