We start in Montreal and reach around the globe.

We probe myriad mysteries, from brains to biofuels.

We move from nanoscopic focus to the vastness of outer space.

How McGill’s research partnerships bring together the world’s best minds to tackle the world’s toughest problems.
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Message from the Vice-Principal
(Research and International Relations)

There exists an image of the solitary genius, toiling day and night, pushing toward a “Eureka!” moment that will clarify deep mysteries. The parts are true enough. Research does entail long hours of hard work. Illuminating breakthroughs do strike. And having a nimble, brilliant mind certainly helps. But isolation isn’t a hallmark of today’s research.

Whether we’re talking chemistry or economics (or medicine, or engineering, or...), teamwork drives innovation. At McGill, we know that collaboration, between colleagues and between professors and students, is the soil from which outstanding ideas grow. Research partnerships don’t stop at the campus gates, either.

There are challenges that simply can’t be met by any one university or company. A massive project like the Large Hadron Collider in Switzerland was once thought impossible—and, in fact, is only possible through the collaboration of 8,000 physicists and hundreds of universities in some 85 countries (including, from McGill, eight professors, four post-doctoral fellows and research assistants, and seven graduate students), making it likely the largest inter-institutional and international research infrastructure project ever realized. The goal for my office’s partnership staff is to develop domestic and international research partnerships that, although not on the scale of the Large Hadron Collider (but, really, what is?), will help build the future.

Sometimes it’s about bringing new blood to McGill. The University is excited to have four proposals among the 40 shortlisted for the Canada Excellence Research Chairs program, which aims to attract and support world-class researchers in areas of strategic importance to Canada. Keep an eye on the newly redesigned Headway website (http://publications.mcgill.ca/headway) for CERC developments.

Sometimes it’s about forging new relationships between our existing talent and other parts of the world. Case in point: The Canada-California Strategic Innovation Partnership, co-administered by ISTP Canada and the University of California, aims to parlay industrially relevant R&D projects into new business models of bilateral collaboration. McGill is thrilled to be leading five of the 15 projects granted in Canada—a reflection of our researchers’ high calibre—and eager to build strong partnerships in what is widely considered a global centre for technology and environmental innovation. On the other side of the globe, we’ve been deepening our relationship with RIKEN, one of Japan’s largest research organizations. New McGill-RIKEN collaborations include the FANTOM4 Consortium about mammalian gene control (McGill professor of biochemistry Josée Dostie is the only Canadian member) and Paul Lasko’s Developmental Biology Research Initiative to explore the mechanisms behind regenerative medicine. We’re confident this is just the beginning of a long, prosperous relationship with what is one of the world’s leading sites of interdisciplinary research excellence.

That’s tomorrow. Then there are our partnerships that are bearing fruit today—and that’s the focus of this, our eighth issue of Headway. Whether it’s understanding the mysteries of the human brain (page 11), or reducing harvest spoilage (page 22), McGill researchers are using partnerships to drive change. Because behind every outstanding breakthrough is an outstanding team.

McGill has much to be proud of in its teams’ achievements. During my tenure as Vice-Principal, I have been extremely proud to have helped build many of the partnerships you will read about between these covers—and I eagerly look forward to the breakthroughs and innovations the coming years will bring.

Denis Thérien
Vice-Principal
(Research and International Relations)
Catherine Bradley has made and designed costumes for theatre companies across Canada, including the Stratford Festival, the National Arts Centre, the Montreal Opera and the National Ballet. Since 1988, she’s also taught the art of costuming, and its history, in McGill’s Department of English. Working with her students on productions in Moyse Hall, she noticed a recurring problem: Excellent design ideas get overlooked when presented through primitive sketches. So, working with Concordia communications grad student Sawssan Kaddoura, and using her own costuming students and the scenography students at the National Theatre School of Canada as beta testers, Bradley designed the Digital Costume Illustration System. DCIS allows a layperson to easily transform a digital photograph of an actor into a detailed costume drawing that is perfectly proportioned to that person’s exact measurements. Beyond the boards, Bradley thinks the design system has applications for fashion design, especially for clients with physical challenges that put them “outside of standard dimensions.” “It’s about levelling the playing field so the ideas are the most important thing, not the execution of the sketch, so that good ideas get produced,” says Bradley. “It’s also about accepting different body shapes for what they are. I want to build costumes to fit real people with all of our quirks and irregularities.” For her next project, Bradley is collaborating with Montreal’s McCord Museum and the Ryerson School of Fashion Design to create an online database of archival fabric patterns, which, like the DCIS, will be available on the Web. “It’s fundamental to all my research that the results are for the public, free of charge.”

The Digital Costume Illustration System was funded by an Image, Text and Sound Technology Grant awarded by the Social Sciences and Humanities Research Council of Canada.

Catherine Bradley, photographed in the McGill Costume Shop in the basement of Moyse Hall, on November 25, 2009, by Rachel Granofsky.


Beginning with a photo of an actress, digital artist Z. Lynda Bathory created a DCIS costume design for the role of Titania in Shakespeare’s A Midsummer Night’s Dream. The images are part of an online instructional video (http://digitalcostumeproject.mcgill.ca).

A 1938 McCall’s pattern book, a gift from Nathalie Cooke, the Faculty of Arts’ Associate Dean of Research and Graduate Studies. “I use resources like this to show students how each period in history has its own ideal body shape. The boyish figure popular in the 1920s shows a different fashion ideal from the buxom Barbie doll figure of the 1950s.”

Mary Thomas, the wardrobe manager at Montreal’s Centaur Theatre, often redirects clothing donations—such as this hand-embroidered silk kimono (circa 1920)—to McGill’s Drama and Theatre program. “Students in costuming who are learning hand stitches for the first time are blown away by the intricacy and artistry of a piece of this calibre.”

A Tudor-style corset made by Anna King, one of Bradley’s former students. Much of Bradley’s research focuses on manipulating body shapes, both on actual people and in digital images.

In 1990, Bradley spotted a refrigerator box overflowing with hundreds of wooden hat-making forms. She convinced the owners, the children of a retired Montreal milliner, to let her fill her car trunk. The milliner insisted on burning the rest. “He was adamant that hat forms make the best firewood!”
Good Ethics for Good Science

The accelerated world of medical research promises new diagnostic tools and treatments for Parkinson’s disease, multiple sclerosis, Alzheimer’s disease, and even cancer. These advances, however, raise a daunting array of ethical issues.

Enter Bartha Maria Knoppers, the recently appointed director of McGill’s new Centre of Genomics and Policy. Knoppers is a world-renowned bioethicist whose work recently earned her a Distinguished Visiting Scientist Stipend from the Netherlands Genomics Initiative. At the McGill centre, Knoppers leads a research team that tackles issues ranging from stem cell controversies to privacy concerns surrounding our individual genetic and genomic makeup. The aim is to promote good science and responsible research, while educating the public along the way.

The centre is located within the McGill University and Genome Quebec Innovation Centre, placing it at the heart of the genomic action. “It’s important in the development of policy to be surrounded by the very scientists and fields of science in which you’re working,” says Knoppers.

Five domains form the core of the centre’s work: procreation and reproductive policy; pediatrics, including the involvement of minors in genomic research; populations, including biobanks that store and organize genetic material and track whole populations; privacy; and the developing field of pharmacogenomics and personalized medicine, in which health care can be tailored to individual genomic and phenotypic data.

The centre’s own research database (publicly accessible at www.humgen.org) collects laws and policies from around the world and is used by high school students, royal commissions, scientists and policy-makers—anyone dealing with ethical questions in genomics research. The site also provides expert analysis from the research team: “We prepare editorials that people can use to analyze what’s happening regionally, internationally, or on a country-by-country basis.”

Knoppers heads up the Public Population Project in Genomics as well, providing IT tools for researchers to share data between large population biobanks. The biobanks collect enormous amounts of information on genetics, lifestyle, nutrition, income and other factors to examine how genes interact with their environment. Networking such information will provide scientists with a bigger picture than they’ve ever had before.

“It means that the science moves faster, it’s statistically more powerful and thus more significant.”

Sound policy, too, helps move the science forward. Knoppers made news as the lead author of the Stem Cell Charter presented in September 2009 at the World Stem Cell Summit in Baltimore, where the aim was to affirm the importance of stem cell science for humanity. “We want to bring stem cell science back into the public domain, away from some of the scandals and controversy,” declares Knoppers, “and prepare a code of conduct based on responsibility, protection of citizens, intellectual freedom, transparency and integrity. And then kick-start international research under these five principles.”

The Centre of Genomics and Policy receives funding from the Stem Cell Networks of Centres of Excellence, the Canadian Breast Cancer Research Alliance, the European Commission, the Public Health Agency of Canada, the Fonds de la recherche en santé du Québec, the Canadian Institutes of Health Research, the Social Sciences and Humanities Research Council of Canada, Génome Québec, Genome Canada and the Canadian Partnership Against Cancer.

Balz for Milner

Brenda Milner needs a bigger mantelpiece. On November 20, 2009, in a ceremony held in Berne, Switzerland, the legendary Montreal Neurological Institute researcher received the International Balzan Prize, yet another entry on her long list of prestigious accolades. The Balzan Prize, given in memory of the late Italian newspaperman Eugenio Balzan, aims to “foster culture, the sciences and the most meritorious initiatives in the cause of humanity, peace and brotherhood among peoples throughout the world.” The prize is worth one million Swiss francs (approximately $1 million); half the money is earmarked for research. The award acknowledges Milner’s groundbreaking contributions to modern cognitive neuroscience. (See the Summer 2009 issue of Headway for an interview with Professor Milner about her storied career.) She is the recipient of numerous academic awards, including the Gairdner International Award in 2005 and the Prix Wilder-Penfield (Prix du Québec) in 1993. Milner is also a fellow of the Royal Society of London and the Royal Society of Canada and was promoted to Companion of the Order of Canada in 2004. In 2007, Milner created the Brenda Milner Foundation to support and foster young researchers in the field of cognitive neuroscience through postdoctoral fellowships at the MNI.
Strategic Research Networks: Of Health Care and Earthquakes

The Natural Sciences and Engineering Research Council (NSERC) is funding nine new Strategic Research Networks that support the research priority areas identified in the Government of Canada’s Science and Technology (S&T) Strategy. Two of these initiatives are based at McGill: the Healthcare Support through Information Technology Enhancements (hSITE) and the Canadian Seismic Research Network. The projects were selected through a peer-reviewed competition. NSERC will provide each network with $5 million over the next five years.

When Canadians think about how to improve the health care system, “better information technology” may not be the answer that springs to mind. But the hSITE initiative, led by David Plant, professor in the Department of Electrical and Computer Engineering, is built on the idea that novel, advanced communications systems and infrastructures will boost health care workflows, patient care and safety—as well as help deliver more efficient and cost-effective health care to Canadians.

The researchers will focus on wireless communications, networking, software, location technologies and smart systems. “One example is emergency rooms,” says Plant. “By providing health care workers with timely information, such as scan or blood test results, on device platforms that work for them like laptops or hand-held computers, they will make better decisions.”

The network brings together 17 researchers from McGill, University of Toronto, University of Ottawa, University of Waterloo, Université Laval, University of Calgary and Carleton University. Eight health care partners—McGill University Health Centre, Mount Sinai Hospital, North Simcoe Muskoka Local Health Integrated Networks, Ontario Ministry of Health, Sunnybrook Health Sciences Centre, SCO Health Service, St. Michael’s Hospital and Toronto Central Local Health Integrated Networks—will “bridge the gap” between clinicians and industry partners, including TELUS-Emergis, RIM, Nortel, IBM and HInext.

Earthquakes may not be as immediate a Canadian concern as health care, but civil engineering professor Denis Mitchell thinks we should be ready for the ground to shake.

“Seismic activity is a really serious problem,” he says, “and we’ve had some major earthquakes in Quebec—magnitude 7, for example—quite a few years ago. They’re bound to come back. The only thing we can do to guard against it is to make sure our structures are capable of resisting these major events.”

To that end, Mitchell is heading the Canadian Seismic Research Network, which is aimed at mitigating the impact of earthquakes on Canada’s urban centres. The network comprises 26 researchers drawn from McGill, Université de Sherbrooke, École Polytechnique de Montréal, University of Ottawa, Carleton University, University of Toronto, University of Western Ontario and the University of British Columbia.

Resilient though it may seem, much of our infrastructure predates proper seismic provisions, which emerged in the mid-seventies, and can’t withstand the stresses earthquakes impose. “That’s where we have a problem,” Mitchell says. “You want to make sure that your bridges are still functioning after a major event, that the hospitals can still operate properly.” The researchers will map major cities for the seismic risks their key structures face. They’ll evaluate how these structures would resist an earthquake before focusing on how to improve them.

NSERC is a federal agency that invests in Canadian science and technology by supporting some 28,000 university students and postdoctoral fellows, and more than 11,800 university professors every year. NSERC also fosters innovation by working with 1,500 Canadian companies that participate and invest in post-secondary research.

On November 18, 1929, a magnitude 7.4 earthquake created a tsunami that caused an estimated $1 million damage and 28 deaths in Newfoundland.
CRCs, New and Renewed

On September 23, 2009, Gary Goodyear, Minister of State (Science and Technology), announced that 19 McGill researchers were among the 181 newly appointed or renewed Canada Research Chairs. McGill received nine Tier 1 and 10 Tier 2 Chairs worth a total of $17,600,000. “Canada’s government is investing in science and technology to strengthen the economy, improve Canadians’ quality of life and create the jobs of tomorrow—today,” said Minister Goodyear. “The Canada Research Chairs program helps attract and retain the best researchers from the country and around the world to Canadian universities, which has direct benefits for our communities.”

McGill’s new CRCs are:
- Marco Amabili, vibrations and new fluid-structure interaction (Tier 1)
- Catherine M. Bushnell, clinical pain research (Tier 1)
- Brian E. Chen, neural circuit formation (Tier 2)
- Allan R. Greer, colonial North America (Tier 1)
- Tommy J. Nilsson, proteomics and systems medicine (Tier 1)
- Seok-Woo Son, global climate variability (Tier 2)
- Michael Wagner, speech and language processing (Tier 2)

McGill’s twelve renewed chairs are:
- Jake E. Barralé, osteoinductive biomaterials (Tier 2)
- Albert M. Berghuis, structural biology (Tier 1)
- Aashish Clerk, theoretical mesoscopic physics (Tier 2)
- Russell Davidson, economics (Tier 1)
- Eliot Fried, interfacial and defect mechanics (Tier 1)
- Andrew Gonzalez, biodiversity (Tier 2)
- Desmond R. A. Manderson, law and discourse (Tier 1)
- Alexei Miasnikov, algebra (Tier 1)
- Jay Louise Nadeau, nanocellular neuroscience (Tier 2)
- Cirilaco A. Piccirillo, regulatory lymphocytes of the immune system (Tier 2)
- Phillip D. Servio, gas hydrates (Tier 2)
- Jason C. Young, molecular chaperones (Tier 2)

Additionally, the Canada Foundation for Innovation is investing more than $750,000 to fund research infrastructure essential to the work done by Amabili, Fried, Nilsson, Servio, Son and Wagner.

“McGill is very grateful to the Canada Research Chairs program for this important funding,” said Denis Thérien, Vice-Principal (Research and International Relations). “We are attracting top talent to our University through the program, bringing in a generation of researchers who are advancing discovery and innovation in exciting new directions.”

The Government of Canada created the Canada Research Chairs program in 2000 with the aim of making Canada one of the world’s top five countries for research and development. McGill has used the program to recruit exceptional international researchers and to repatriate outstanding Canadian and Quebec researchers.

Stargazer Wins Prix du Québec

Vicky Kaspi had to divert her gaze from the heavens long enough to shake some hands and collect some more hardware. McGill’s Lorne Trottier Chair in Astrophysics and Cosmology and Canada Research Chair in Observational Astrophysics was awarded a 2009 Prix du Québec, the highest honour conferred by the provincial government, in recognition of her contribution to the social and scientific advancement of Quebec. Kaspi received the Prix Marie-Victorin for natural sciences and engineering on November 3, 2009, at a ceremony at the National Assembly in Quebec City.

“While Professor Kaspi’s meteoric talent and groundbreaking contributions to the world of astrophysics have made waves nationally and internationally, being lauded at home, in Quebec, makes us all very proud,” says Denis Thérien, Vice-Principal (Research and International Relations).

Kaspi is a world-renowned physicist known for her cutting-edge work on neutron stars, pulsars and supernovae remnants. In 2005, Kaspi and her team discovered the fastest-rotating pulsar known to science and more than 20 pulsars in a single star cluster in the Milky Way. Most recently, her team was the first to witness a cosmic act of recycling involving a dying pulsar.

The Prix Marie-Victorin is only the latest of Kaspi’s many awards. She has been honoured with the Steacie Prize in the Natural Sciences, the Rutherford Memorial Medal of the Royal Society of Canada, the Canadian Association of Physicists’s Herzberg Medal and the Canadian Institute for Advanced Research Young Explorer Prize.

The Prix du Québec are presented annually to distinguished researchers for their outstanding contributions to their field or in honour of a career devoted to research management and development or promotion of science and technology. Winners receive $30,000 and a silver medal created by a Quebec artist. Kaspi joins a long list of illustrious McGill researchers who have been awarded the Prix du Québec, including past Prix Marie-Victorin recipients Graham Bell and Lawrence Mysak.
Home of the Cosmic Rays

Scientists long tried to figure out why some spots on Earth had more radioactive air than others. It wasn’t until 1912, when Victor Hess took an electrometer skyward in a balloon, that it became clear the extra radiation was coming, not from inside the Earth, but from above it. Way above it. But where exactly did these “cosmic rays,” as physicist Robert Millikan dubbed them, come from? (The rays are, more precisely, high-energy charged particles.) An international network of astronomers, including researchers from McGill, just might have a lead on this mystery.

In a paper published in the November 1, 2009, online edition of the journal *Nature*, the team announced the first detection of very-high-energy gamma rays originating from a starburst galaxy. The discovery clearly links the life-cycle of stars with the acceleration of cosmic rays. Using the VERITAS (Very Energetic Radiation Imaging Telescope Array System) observatory in Arizona, David Hanna and Kenneth Ragan, professors in McGill’s Department of Physics, and their colleagues found high-energy gamma rays coming from an area of intense stellar production and death.

VERITAS is operated by a collaboration of more than 100 scientists from some 20 different institutions in Canada, the United States, Ireland and England.

“This discovery will provide more clues to the production and acceleration of cosmic rays,” says Kenneth Ragan.

“Collectively, cosmic rays carry as much energy as all the starlight in the universe,” adds David Hanna. “A better understanding of their production and propagation will add enormously to the knowledge we have already gained from centuries of optical astronomy.”

Professors Hanna and Ragan’s work is funded by NSERC and FQRNT. In addition, VERITAS receives funding from the U.S. Department of Energy, the U.S. National Science Foundation, the Smithsonian Institution, Science Foundation Ireland and the U.K. Particle Physics and Astronomy Research Council.

Royal Society Honours

At ceremonies held in Ottawa on November 28 and 29, 2009, the Royal Society of Canada recognized the achievements of four McGill researchers.

Brian Alters, director of McGill University’s Tomlinson Project in University-Level Science Education, received the 2009 McNeil Medal for the Public Awareness of Science. The medal was presented to Alters for his world-famous work on the promotion of education about evolution. “The study and practice of science is based on observation, measurement and logical conclusions,” says Alters. “My goal is to make science less threatening to people.”

The Royal Society also elected 77 new Fellows into its ranks, including:

- Bruce Reed (School of Computer Science) for his contributions in the areas of discrete mathematics and probabilistic combinatorics.
- Vincent Giguère (Rosalind and Morris Goodman Cancer Research Centre) for his leading work in the field of nuclear receptors, which has led to major advances in our understanding of hormone-dependent cancers and metabolic disorders.
- Allan Sniderman (McGill University Health Centre, Division of Cardiology) for introducing apolipoprotein B, now recognized as the superior cholesterol marker, into clinical practice worldwide.

The Royal Society of Canada is the senior national body of distinguished Canadian scholars, artists and scientists; in November 2009, McGill’s Roderick A. Macdonald became the RSC’s new president and the first law professor to hold the position. The primary objective of the RSC is the promotion of learning and research in the arts and sciences. The RSC’s nearly 2,000 Fellows are selected by their peers for outstanding contributions to the natural and social sciences, in the arts and in the humanities. As Canada’s national academy, the RSC exists to recognize academic excellence, to advise governments and organizations, and to promote Canadian culture.
The Dangers of Drinking

Bertrand Russell once described drunkenness as “temporary suicide,” a phrase that might turn out to be more literally true than the great philosopher knew. Heavy drinkers of beer and spirits face a much higher risk of developing cancer than the population at large, according to a recent study published in the journal *Cancer Detection and Prevention* by researchers from McGill, INRS-Institut Armand-Frappier and Université de Montréal.

Their findings show that people in the highest consumption category increased their risk of developing esophageal cancer sevenfold, colon cancer by 80 per cent and even lung cancer by 50 per cent.

In all, the researchers found statistically significant relationships between heavy consumption of beer and spirits and six different cancers. Moderate drinking (i.e., less than daily) and wine consumption did not show the same effects.

“We looked at the data in two ways,” says lead author Andrea Benedetti, who was a PREECAN post-doctoral fellow at the INRS, Institut Armand-Frappier while this work was conducted. Benedetti is now an assistant professor in McGill’s Department of Medicine and in the Department of Epidemiology, Biostatistics and Occupational Health. “We compared people who drank heavily to our reference group, who abstained or drank only very occasionally. We also looked for trends across our categories: non-drinkers, weekly drinkers and daily drinkers.”

“This study crystalizes many strands of evidence from different studies on different types of cancer and alcohol consumption,” says Dr. Jack Siemiatycki, Canada Research Chair and Guzzo Chair in Environment and Cancer at Université de Montréal.

“For the most part we showed that light drinkers were less affected or not affected at all,” says Benedetti. “It is people who drink every day or multiple times a day who are at risk. This adds to the growing body of evidence that heavy drinking is extremely unhealthy in so many ways. Cancer very much included.”

"This study was supported by Health Canada, the Canadian Cancer Society Research Institute, the Institut de recherche en santé et sécurité au travail du Québec, the Fonds de la recherche en santé du Québec and the Canadian Institutes of Health Research."

Casualties of Conflict

We hear increasingly about the difficulties of veterans trying to return to ordinary life after a stint in the military. Associate professor of social work Myriam Denov is involved with a group of former soldiers whose re-entry into society is nothing short of miraculous.

Denov works with children in Sierra Leone who have been both perpetrators and victims of violence in armed conflict. Many were abducted, forced into armed groups and ordered to murder, rape and torture “enemies,” mainly civilians. The young people—girls as well as boys—were often fed powerful drugs to gear them for combat.

Since the decade-long civil war ended, these youth have had “enormous issues of guilt and shame to deal with,” says Denov. “Many communities rejected the children. They couldn’t go home so they migrated to urban areas where they could remain hidden.”

For some, life is still harsh. Denov, whose book *Child Soldiers: Sierra Leone’s Revolutionary United Front* will be released in January 2010, has met many former child soldiers. “I came across a slum community in Freetown where I found the worst of the worst-off living on the streets: no family, no support system, no school. They’ve remained in semi-militarized structures because it’s all they know. It’s incredibly grim.”

But not all stories are bleak. “Girls are doing a good job bringing up children born of rape. And there are cases of young people who have carved out a new niche.” She cites a group who worked cooperatively to set up a motorbike taxi business, even organizing unions. “They are learning to use political means and to get what they need in non-violent ways. It does give you hope.”

"Professor Denov’s research is funded by SSHRC.

Gold-en Hall of Fame

Dr. Phil Gold made Canadian medical history in 1965—and now it’s official. Forty-five years after he and his colleague Dr. Samuel Freedman discovered the carcinoembryonic antigen (CEA)—which, as the first clinically useful human tumour marker, revolutionized the diagnosis and management of cancer—Gold is being inducted into the Canadian Medical Hall of Fame. He is professor of medicine, physiology and oncology in McGill’s Faculty of Medicine, and executive director of the Clinical Research Centre at the Montreal General Hospital.

“The relevance of Dr. Gold’s discovery over four decades ago stands today as an indelible testament to the value of research,” says Dr. Vassilios Papadopoulos, Director of the Research Institute (RI) at the MUHC. “He is a trusted friend to his colleagues, an invaluable contributor to many RI committees and a role model for young investigators.”

At a ceremony in April 2010, Dr. Gold and five other inductees will join the ranks of the previous 76 laureates who have pushed the boundaries of knowledge to improve human health. Gold’s research has also made him a Companion of the Order of Canada, an Officer of the Ordre national du Québec and, as a Montreal native, a member of the Academy of Great Montrealers. He has received the F.N.G. Starr Award from the Canadian Medical Association and, with Dr. Freedman, the Gairdner Foundation International Award.

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On a mantel in his Peel St. office in Montreal, McGill Faculty of Law associate professor Ram Jakhu keeps a model of an INSAT-2 satellite. The INSAT-2 series, first launched in 1992, played a large role in developing India’s telecommunications capacity. But satellites, even historic ones, eventually outlive their usefulness. In the case of INSAT-2, the 2,550-kilogram satellite was good for about 12 years. After that, it became 2,550 kilos of junk orbiting the Earth. It wasn’t alone.

As the associate director of McGill’s Centre for Research of Air and Space Law (CRASL), Ram Jakhu considers the legal ramifications of space junk, the man-made detritus that’s left to float through the cosmos. And there’s a lot to consider. The United States Space Surveillance Network has catalogued over 17,000 drifting objects—mostly discarded pieces of spacecraft, rockets and satellites—that exceed 10 centimetres in diameter, and there are an estimated 300,000 other objects that are between one and 10 centimetres in diameter. (There are also likely millions of even smaller pieces.) Orbiting at speeds ranging from 10,800 kilometres to 27,400 kilometres per hour, even a small chunk of old rocket can do serious damage to a shuttle or communications satellite, or kill an astronaut engaged in extravehicular activity. Even though it’s designed to burn up in re-entry, such junk, along with whatever residual fuel or radioactive material it may contain, can also sometimes fall to Earth, contaminating areas in which it lands.

The accumulation of space junk can impede exploration. And while pinpointing who is legally responsible for unmarked debris—or even collisions involving identifiable debris—is difficult, properly enforced policies can ensure that less junk is left up there in the first place. “That’s my pursuit,” says Jakhu, “to seriously contribute to the development of appropriate rule of law in space, including the control of space debris, so that this final frontier remains a useful environment for the benefit of all mankind.” He and his colleagues are proposing these laws and regulatory policy mechanisms, in the hope governments will adopt them.

In 1951, 1 year after the U.S. launched its first rocket at Cape Canaveral, McGill University introduced its own cosmic first: the world’s first space law program. In 1976, the University added CRASL, the Institute of Air and Space Law’s interdisciplinary research centre, which focuses on the technical, economic, policy and legal implications that arise when humans take to the heavens—or, in the case of space junk, what’s left behind in the heavens. Jakhu himself began studying space debris in the early eighties, when graduate student
Howard Baker, now a senior legal officer with Canada’s Department of Justice, chose it as his thesis topic. “It was something very new,” Jakhu says. “This was the first important environmental problem in space.” The problem persists. In the half century since the Sputnik I satellite kicked off the Soviet-U.S. space race, the ramifications of leaving junk in space have gone largely unconsidered. “Nobody bothered,” Jakhu explains. “They said, ‘Come on, space is big. How could this be a problem?’” Space may indeed be infinite, or at least very large, but man-made debris is concentrated in relatively small sections (known as Low Earth Orbits and the Geostationary Orbit), which are increasingly well trafficked by observation missions and telecommunication satellites. Despite this mounting threat of collisions, there are still no specific laws covering the production and management of space debris. (This despite a 1978 incident in which the Canadian government was stuck with a $3 million bill to clean up the radioactive mess when the Soviet Cosmos 954 satellite plummeted to the Northwest Territories. People started talking seriously about the need for space laws, but ultimately Canada’s initiative to develop international rules for nuclear power sources on satellites mostly fell on deaf ears.) Guidelines exist, but neither established nor emerging space powers bother to follow them regularly. “Governments are interested in space debris,” says Jakhu, “but are not taking any strong or effective measures to control this debris and to find solutions to this issue.” That’s where Jakhu and his colleagues, from McGill and Germany’s University of Cologne, come in. Jakhu has long known the director of Cologne’s Institute of Air and Space Law, Stephan Hobe, whose master’s thesis he oversaw in 1986. Their ongoing collaboration fell easily into place.

In 2007, the United Nations Committee on Peaceful Uses of Space (UNCOPUOS) established guidelines to slow the creation of space debris. These guidelines suggest that only necessary debris—from, say, shuttles being launched—be left in space, and that vessels carrying fuel release this fuel, to prevent debris-producing explosions. Yet, there is nothing in place to prevent a nation from, say, testing long-range weapons by blasting its own derelict satellites into smithereens, as China did to its Feng Yun 1C weather satellite on January 11, 2007. (It’s estimated that the destruction of Feng Yun 1C alone created some 40,000 pieces of debris larger than one centimetre, doubling the amount of space junk at that altitude.) “The UNCOPUOS guidelines are a good step, that’s a first step, but what happens to the hundreds of thousands of pieces already there?” Jakhu says. “The physics of space seems to be such that you can’t have a vacuum cleaner there.”

At a CRASL international interdisciplinary space debris conference at McGill in May 2009, participants assessed the seriousness of the problem: How much junk is up there? Whose is it? What happens when satellites fail to return to Earth or remain intact when they do? Who should monitor space junk? “It’s dangerous for everybody,” Jakhu says. In April 2010 in Cologne, the researchers will use data presented at the conference to draft proposals for laws and other regulatory mechanisms that would address the issue of space debris.
Outer space’s gravest hits

Devastating space junk collisions are becoming more and more frequent, and that’s bad news for owners of the $18 billion worth of commercial satellites, not to mention other spacecraft, currently orbiting the Earth. (Astronauts haven’t been hit by space junk, but that danger is real, too. In fact, a September 2009 spacewalk was almost scrubbed when NASA feared that orbiting rocket scrap would pass too close to the International Space Station.) At the International Interdisciplinary Congress on Space Debris, hosted by the McGill Institute of Air and Space Law in May 2009, David Wright from the Union of Concerned Scientists (a global non-profit organization born out of collaboration between MIT students and faculty), recounted some of the biggest bangs in the increasing trend of cosmic collisions:

**December 1991:** The inactive Russian Cosmos 1934 satellite smashed into debris from the Cosmos 296 satellite. The event went unnoticed for more than 10 years, when U.S. Space Surveillance Network analysts spotted anomalies in historical tracking data.

**July 24, 1996:** A discarded Ariane H-10 rocket stage, orbiting Earth since the 1980s, severed a boom on the French CERISE microsatellite.

**August 23, 1997:** Uncatalogued debris bumped the inactive U.S. NOAA 7 weather satellite out of orbit, releasing additional debris.

**April 21, 2002:** Uncatalogued debris hit Russia’s inactive Cosmos 539, changing the satellite’s orbit and creating substantial additional space junk.

**January 17, 2005:** A U.S. upper stage rocket, discarded in 1974, collided with a Chinese rocket stage launched in March 2000.

**May 22, 2007:** Uncatalogued debris knocked the European Meteosat 8 weather satellite out of orbit, damaging its thermal protection.

**November 10, 2007:** Uncatalogued debris changed the orbit of the NASA Upper Atmosphere Research Satellite.

**February 10, 2009:** The inactive Russian Cosmos 2251 satellite drifted off course, destroying the Iridium 33 telecommunications satellite—and spiking satellite insurance rates by as much as 20 per cent.

Aimed at slowing the proliferation of space junk, which they will then present to space powers and the United Nations. “Of course, governments may accept or reject these suggestions,” Jakhu says. “But I think they’ll recognize that these come from a group of experts, and that they should be considered seriously.”

“What is really required is that we enact rules that impose duties upon states and private actors, which they’d have to observe while carrying out outer space activities,” says Cologne’s Stephan Hobe. “Without liability, there are no consequences and, moreover, no incentive to avoid pollution.”

Nations that flout the law, Jakhu says, should be reprimanded by bodies like the UN, or brought before an international court of justice. (Jakhu was in fact recently appointed to a space law advisor group in the Permanent Court of Arbitration in The Hague.) Eventually, he says, it will be in all actors’ interests to follow these laws.

Space debris has also begun to take an economic toll. In February of this year, Cosmos 2251, a Russian satellite, collided with a satellite owned by Iridium, an American telecommunications firm. The telecommunications satellite, valued between $80 million and $90 million, was taken out of commission in a scenario Jakhu likens to two bullets colliding, and Iridium’s clientele was left without service. (See sidebar for a timeline of the increasing frequency of confirmed collisions in space.) “It was resolved through negotiations because nobody could conclusively determine whose fault it was,” he says. To protect its own interests, the private sector, he’s sure, will be forced to pressure governments to take the proper precautions concerning debris.

Governments, in turn, might turn to the Centre for Research of Air and Space Law for insight. “We’re looking at what the law should be,” says Jakhu. “I want to go where others have not gone in the space law field.”

*The McGill Centre for Research of Air and Space Law receives funding from the International Association for the Advancement of Space Safety, the Erin J.C. Arsenault Fund, the Boeing Corporation, the Social Sciences and Humanities Research Council of Canada, the Square World Foundation and the Asia Pacific Foundation of Canada.*
By Andrew Mullins

McGill neuroscientist Robert Zatorre has a standard answer whenever he’s asked whether there is a musical region to the human brain.

“Everything above the neck.”

Music taps into so many processes, explains Zatorre, the co-director of the International Laboratory for Brain, Music and Sound Research (BRAMS). Hearing, memory, planning, motor control, timing, emotion. The breadth of music’s reach across the topography of the brain makes it ideal terrain for research.

Zatorre shares directorial duties at BRAMS with Université de Montréal psychologist Isabelle Peretz. BRAMS brings together researchers—drawn from neuroscience, psychology, music, audiology, education, computer science and engineering—from McGill, Concordia University, McMaster University, the Rotman Research Institute in Toronto and Université de Montréal (U de M). Since forming in 2004, the collaborative lab has earned high praise, being called “an unbeatable team” and “number one by a long shot” in Science magazine.

When we use language, or recall a memory, or make music, we’re calling upon dozens of regions of the brain simultaneously—and BRAMS researchers have a fundamental goal of building a better understanding of the relationship between these regions. Unlike speech, playing an instrument is a specialized skill, and it offers a perfect opportunity to examine the learning process.

“We can bring people in and use different training procedures, train them at different ages, with different instruments,” says Zatorre. “It’s very powerful from the research perspective, because we can control it in the laboratory.”

Insight into how the regions of the brain interact through music could even lead to better rehabilitative therapies for stroke victims, or for people with Parkinson’s disease.

“With Parkinson’s,” says Zatorre, “people have difficulties with organizing movements and sequencing them in time. It turns out that with a musical input like a metronome or listening to music on an iPod, you can

At a collaborative laboratory called BRAMS, scientists from five Canadian universities are unlocking the mysteries of the brain through music and sound.
As an engineer I can say, ‘This behaves like a cello and should be playable like a cello,’ but if you don’t have an expert cellist testing it, you don’t know whether all the data that is captured will be representative of a true cello performance or not.

— PROFESSOR MARCELO WANDERLEY

Regular instruments were clearly unfeasible, so Zatorre and Penhune approached Wanderley, whose lab designs new digital musical instruments. They challenged him to build an MRI-compatible instrument that used no ferromagnetic materials, one that could be played inside the narrow constraints of the scanner tube and also be monitored by computer.

Avrum Hollinger, then a master’s student in Wanderley’s lab and now working on his PhD in music technology at the Schulich School of Music, got to work, beginning humbly with a section of battered keyboard that he had hacked off a clunker from a local piano repair shop. When he finished, they had an 11-key instrument, mounted on Plexiglas, that used fibre optic cable to send light signals to a controller outside the scanner room and create MIDI-triggered sound.

The MRI-compatible keyboard means the researchers can monitor musicians’ brains and at the same time record every aspect of their playing through the fibre optic system. The MRI images and data this generates will provide a view into the brain never seen before.

Next will be an MRI-compatible cello—complete with diminutive bow—and eventually a wind instrument like an oboe or clarinet. Schulich School musicians, such as cellist Erika Donald, provide critical feedback to ensure genuine playability, Wanderley points out. “As an engineer I can say, ‘This behaves like a cello and should be playable like a cello,’ but if you don’t have an expert cellist testing it, you don’t know whether all the data that is captured will be representative of a true cello performance or not.”

The suite of MRI-compatible instruments will allow the researchers to examine the different brain activity generated by each one. A keyboard, for instance, calls for fairly symmetrical motor control of the two hands, and the cello, very asymmetrical control. A clarinet or oboe will add the brain’s management of breathing and embouchure to the resulting neural picture.

Virginia Penhune is particularly interested in how our brains manage motor control, learning and expertise. “There are a lot of findings that say there are brain structural differences between musicians and non-musicians,” she says, “and there can also be short-term changes in your brain when you learn something new. So one of the things we’d like to link up is the structural and the functional changes.”

The views into the brain these instruments open up are manifold.

“We can look at the difference between expert pianists and those who are just so-so,” says Zatorre. “We can look at what happens when the note you play produces a sound which is not the one you intended. An expert musical performer can adjust everything on the fly, and that implies a very complex and fine-tuned brain mechanism. There are a million things we can do.”

Zatorre ultimately sees BRAMS and its shared infrastructure and expertise spurring researchers to tackle all sorts of new questions together.

“Usually in our respective fields, we design a specific experiment to answer a specific question. But our philosophy in creating BRAMS was ‘if we build it, they will come’. There are probably questions that the lab will help to answer that we haven’t even thought of yet.”

■ The BRAMS lab has received $14 million in funding for infrastructure from the Canada Foundation for Innovation.
IN FOCUS

Green Team

We need food. We need fuel. The Green Crop Network is working on ways we can have both. (Hold the greenhouse gases.)

By Thierry Harris

Professor Don Smith, chair of McGill’s Department of Plant Science and scientific director of the Green Crop Network, is not a man to mince words. “There is a time when we are going to have to ask ourselves, Is the planet capable of supporting six billion people? That time is right now.”

Humans are consuming food and fuel in ever-increasing quantities and, as the world turns to plant sources to find non-fossil energy sources, more and more of the elements necessary to support plant life are disappearing. “The world is running out of phosphorus at an alarming rate,” notes Smith, “and we need phosphorus to grow crops.” It’s not just phosphorus, either: water, energy and micronutrients such as copper and zinc—all are crucial to agriculture, all are increasingly scarce.
Biofuels were once thought of as a can’t-miss replacement for oil and other non-renewable energy sources. But many types of biofuels, such as those produced from palm oil in Indonesia, divert potential food materials away from the food stream. The grain required to fill a large car’s gas tank with ethanol, for example, could feed one person for a year. In short, if a harvest is feeding engines, it’s not feeding people. How should the world’s limited growing resources be used, then? Food or fuel? Factoring in global warming—although many trees and plants “eat” carbon dioxide, the production of some biofuels can actually increase the load of greenhouse gases—only further complicates the matter.

The solution to these problems is discovering how to make biofuels that are carbon neutral and don’t compromise an increasingly scarce food supply. That’s a key goal for the Green Crop Network (GCN), a countrywide research initiative spearheaded by Don Smith. Smith, research assistant Magali Merkx-Jacques and network manager Xiaomin Zhou are part of a team of 50 scientists and more than 70 graduate students from 14 Canadian universities (see sidebar on page 15). Researchers from Agriculture and Agri-Food Canada also collaborate with the network.

The GCN, which was founded in 2006, aims to apply a full-spectrum approach to solving renewable energy and carbon emission problems. To this end, Smith and his colleagues developed four research themes:

- Reducing nitrous oxide emissions during crop growth. (Nitrous oxide is a major greenhouse gas.)
- Enhancing carbon sequestration in soil.
- Optimizing yields and performance of crops in carbon-dioxide-rich conditions.
- Developing new crops that expend less fossil fuel in extracting biofuels, thus reducing greenhouse gas emissions.

Smith believes there’s more to be learned from differences than similarities, so the GCN strives to cross-pollinate research disciplines. “It’s about cultivating the right complementary relationships,” says Magali Merkx-Jacques. “The better the complementary relationship, the better funding and research opportunities are going to be present.”

That philosophy has already led to some promising non-traditional collaborations. Joann K. Whalen, professor in McGill’s Department of Natural Resource Sciences, leads one of the GCN’s carbon sequestration projects. Whalen and her team of soil experts are working to transform plant residue into a stable carbon source in the soil, so that carbon dioxide can be removed from the air and sequestered in the soil. Such plants could potentially help farmers produce more carbon neutral biofuels.

“We have a great team but we are really all soil people,” says Whalen. “We don’t have any expertise on plant manipulation whatsoever.”

Through the Green Crop Network, Whalen was able to meet Brian Ellis, a professor at the University of British Columbia and an expert in cellular plant modification. “What’s great about the network is that it brings together all kinds of people looking at the same questions but from different points of views,” says Whalen. “Brian Ellis and I run in different circles. I never would have met him otherwise.”

Ellis explores ways to adjust the metabolic pathways of plants to change the types of compounds they produce. Through the GCN, he’s now sharing those findings with Whalen, who analyzes what happens when those modified plants go into the soil. “I provide Joann with a whole array of genotypes—not only the gene lines that we create at UBC, but the gene lines of other researchers around the world—so she can see how they behave in the soil breakdown,” says Ellis.

The objective is to produce plants that provide a high economic biofuel yield, while creating residue that traps carbon dioxide in the soil. “It’s a win-win situation because you can get economic or energy benefits from using more efficient plants, and then the carbon storage offsets greenhouse gas emissions,” adds Whalen. “This could be potentially profitable to a farmer, who could accumulate carbon credits based on these plants.”

The Green Crop Network isn’t just looking for solutions within Canada’s borders, either. Smith thinks we have much to learn from India’s exotic plants, such as pongamia, which produces seeds with reasonably high levels of biodiesel-suitable oil. And because it is a legume, pongamia does not require any greenhouse-gas-producing nitrogen fertilizer.

Funding international partnerships, however, is tricky. Smith is hopeful that some early successes, such as a recent China-Canada-California collaboration meeting in Shanghai, are convincing governments of the concrete benefits of international research cooperation.

“Things are taking shape quickly,” notes Smith, thanks in part to GCN manager Xiaomin Zhou, who is building strong contacts in China. Although soybean (a potential biodiesel crop) has long been domesticated in China, the country never developed the commercial technology necessary to inoculate the crop with micro-organisms that increase its ability to remove nitrogen from the air.
Research Strength in Numbers

Complex problems require complex solutions. That’s why the Green Crop Network brings together a variety of research expertise from McGill and 13 other Canadian universities. “We’re trying to make plants that can either be used to make biofuels or can be used to sequester carbon out of the atmosphere—and we want to manage the production regime so we’re producing less nitrous oxide and keeping more carbon in the soil,” says Don Smith, McGill plant science researcher and GCN scientific director. “To tackle that kind of big picture, we need to bring together a lot of specific skill sets to complement McGill’s strengths in soils and plant-microbe interactions.” To fill in the rest of the puzzle, Smith scoured the country for experts in areas including:

**Enzyme and bacteria conversion of nitrous oxide:** Illimar Altosaar (University of Ottawa), Jim Germida (University of Saskatchewan)

**Nitrous oxide emissions from soil:** David Burton (Nova Scotia Agricultural College), Gary Kachanoski (University of Alberta)

**Oil production from seeds:** Peter McVetty and Muhammed Tahir (University of Manitoba), Robert Bradley (Université de Sherbrooke)

**Photosynthesis:** William Plaxton (Queen’s University), Fathey Sarhan (Université du Québec à Montréal), Greg Vanlerberghe (University of Toronto), Norman P.A. Hüner (University of Western Ontario)

**Plant-microbe interactions:** Kevin Vessey (Saint Mary’s University)

**Plant-molecular genetics:** Brian Ellis and Ljerka Kunst (University of British Columbia), Bernard Grodzinski, Barry Micallef and Steven Rothstein (University of Guelph)

Smith is working on a proposal to use Quebec-developed soybean germplasm and *B. japonicum* strains to improve Chinese soybean production.

Ideas don’t just flow one way, of course. Quebec and China’s Heilongjiang province have essentially identical crop production conditions, but Quebec has been producing soybeans for a mere 20 years—some 1,000 years less than Heilongjiang farmers. “We have only recently developed soybeans able to grow in our short-season conditions, and the varieties we have come from a relatively narrow genetic background,” Smith says, “while the folks in the Heilongjiang city of Harbin have 1,000 years of acquired variability, all of which is already adapted to our conditions. We need to work with them!”

Smith is also eager to deepen collaborations with Brazilian researchers. “Brazil produces half of its fluid fuel requirements on just one per cent of their agricultural land,” he raves. It’s amazing.” Smith and one of his graduate students, Keomany Kerr, have visited Brazil’s Embrapa, a public-private research organization employing 13,000 people, including 2,600 researchers, and they are now working toward a fully developed international biofuels collaboration.

“Our ethanol program from sugar cane began in the late 1970s. It was a strategic move spearheaded by the high price of oil and by the landowners who had a strong influence on politics at that time,” says Robert Boddey, a researcher at Embrapa. “Our sugar cane plantations produced around 12 to 13 billion litres of fuel during the 1980s and 1990s and employed over 700,000 people, so it made sense for us to keep it going. Now we produce 28 billion litres and this energy reduces carbon dioxide emissions by 80 or 90 per cent. The only fossil fuels we are burning are from the agricultural operations and fertilizing.”

Despite these promising collaborations, one of the biggest challenges facing biofuel development isn’t scientific. It’s convincing governments and the public about the importance of changing consumption habits. “You go through cycles of intense despair and just complete optimism,” says Smith. “My wife says I’m pathologically optimistic and pathologically motivated.” So what motivates him? “I’ve got an 18-year-old daughter, I want to make sure she grows up in a world that is in as good shape as when I was born.”

The Green Crops Network receives funding from the Natural Sciences and Engineering Research Council of Canada. Additional funding comes from the McGill Network for Innovation in Biofuels and Bioproducts.
Here’s To World Health
Why Think-and-Do Tanks?

Because they’re the engine to get this diverse network of experts to develop a system approach to science, policy and action in complex health issues. The Think-and-Do Tanks start the research cycle, and help to drive change on the ground. We’re creating a new transdisciplinary science that feeds, and is fed by, action.

The Think-and-Do Tanks bring together a wide array of experts, from geneticists to micro-economists. What is the philosophy behind this seemingly eclectic inclusiveness?

When Denis Thérien [McGill Vice-Principal, Research and International Relations] saw the line-up for the first Think Tank, he said, “Laurette, how do all these people fit together?” [laughs] My answer then, and now, is that not all the issues surrounding health are “health issues.” In fact, many of the most intractable health issues facing the world today stem from the collision of historical biological conditioning and everyday contemporary social and economic conditions. That’s why we need to bring together scientists in all domains and decision-makers at all levels and in all sectors.

I’m a scientist in consumer psychology and marketing. I need to work with scientists in operation management, finance, political science—and, of course, health and medicine. So many things have to be put together. When we build the list of invitees, we think about what piece of the puzzle is missing, and then figure out who the top person in the world is in that area—and the acceptance rate for people we’ve invited is very high—and then stretch everyone’s thinking and pave the ways to innovation and action. We want, for example, to get the best financial minds to start thinking about how to curb childhood obesity or reduce health inequity.

What has the Brain-to-Society research program yielded so far?

Our research looks at individual choice in domains like food, where behaviour is driven by the constant interaction between brain and society systems—we’re looking at both as part of the same complex, dynamic and adaptive systems in need of alignment. There are many motives driving human behaviour; knowledge and education aren’t the whole story.

So getting people to eat well is much trickier than putting up billboards of carrots.

We need to move away from this simplistic idea that if we let people know what to eat, they’ll eat it. It’s much, much more complex. We’re exploring a different approach from the traditional “Count your calories and be good.” It may lead to novel individual interventions. There’s new work being done in our group about the psychological concept of attachment and the relative consumption of fruits and vegetables vis-à-vis their more caloric alternative. We’ve done a study on kids between 7 and 12 and their parents, about their consumption and knowledge of fruits and vegetables and fats and sugars. We’re finding that, in both the children and the parents, the more securely attached people were more likely to
There is clearly some truth in this. What I would like to suggest is that the same knowledge can serve to promote healthy eating as well. Over the past ten years, neuroscience technology like fMRI has shown that learning occurs constantly in the striatal dopamine systems, the brain systems at the core of our biological programming for food. But it doesn’t learn in the same way as the “rational,” but attention-demanding, executive function systems. Much of the recent neuroscience has been to study the reinforcement-based learning processes that are at the roots of conditioned responses to environment cues. My son once explained this part of our Brain-to-Society research program to a friend in this way: Can you condition your brain to get excited about broccoli instead of chocolate?

The research program also examines the possibility of identifying individual differences in one’s susceptibility to environment cues. At the level of the dopamine brain system, there are individual differences that cannot only be studied in the scanner, but can also be studied by neurocognitive tests that you can administer to a much larger sample. There are also psychological scales, such as the Behavioral Approach Systems scale that relates to individual differences in dopamine systems’ responsiveness to the environments. So we’re studying an individual’s choice and behaviour as a function of biology, psychology and environment. For example, one research team—Catherine Paquet from the University of South Australia, Baerbel Knauper from McGill, and Mark Daniel, Van Kestens and Lise Gauvin from Université de Montréal—found that the density of fast food vendors around where one lives is only a significant predictor of fast food consumption for individuals who score in the top thirtile on the BAS scale. I think it’s more complicated to get someone to change their behaviour than it would be to send them to the moon.

**What is the next step in the MWP’s research agenda?**

We’re creating the Brain-to-Society Research Centre for Mental and Physical Health and Well Being, which will be the research anchor of the MWP. What we’re seeing is that between the gene and the environment there is life. There are decisions made by individuals, there are choices made by society. Let’s start to use science to model that. It will look at those domains where there is a convergence or divergence between health and economics.

**Such as?**

Issues involving individual choice, such as addiction, physical activity, sleep, stress, school drop-out rates, aggression. Beyond that, we want to examine issues such as food security and health care access.

It’s amazing what happens when you realize how many connections are at play. Four years spent working on obesity and chronic disease led us to start thinking about agricultural production. Last year we hosted a convergence workshop on how to better integrate micro-farmers, who make up 70 per cent of the poor worldwide, with the existing industrial chain—to ensure more sustainability and security. It’s not just about the interface between agriculture and health and nutrition, it’s about the interface between agriculture and the industrial production chain, too.

**Is the MWP’s end goal to change policy?**

That’s just part of it. We’re also looking at self-management, at helping individuals. Policy is important, but it will never be enough. Gaétan Morency, who is one of Cirque du Soleil’s senior vice-presidents and sits on the World Platform’s Strategic Advisory Board, talks about the need to put social health into the DNA of business. Not old-fashioned philanthropy, but things like Bill Gates’s idea of creative capitalism [using market forces to address the needs of the poor], or C.K. Prahalad’s inclusive capitalism [addressing underserved consumers]. That’s exactly what the Platform is about: recognizing that there are major problems tied to the divide between health and economics, and creating more convergence. We want to be known as the place where serious health discussions and serious business discussions co-exist.

*The McGill World Platform for Health and Economic Convergence receives financial support from Health and Social Services Quebec, Health and Social Services Montreal, the Public Health Agency of Canada, the Lucie and André Chagnon Foundation, Développement internationale Desjardins, the Canadian Institute for Health Information and the University of British Columbia’s College for Interdisciplinary Studies.*
A nine-year-old disabled Palestinian girl couldn’t go to school because she couldn’t climb the stairs in her apartment building. Across the border in Israel, a municipality sued residents for not fixing sewage leaks. Meanwhile, a group of elderly Jordanian women had gone blind and lost hope of ever seeing again.

These stories may not spring to mind when one hears the words “Middle East” and “conflict,” but such problems are a consuming force in many people’s lives. The good news? With the right kind of teamwork, these woes can be fixed.

A coalition of social work agencies, for example, built a bridge to give the Palestinian girl access to transportation directly from her fourth floor home. The Israeli neighbourhood learned about its civic rights and, in doing so, discovered that the leaking pipes were the responsibility of the municipality. The elderly Jordanian women received medical check-ups, which revealed they just needed glasses.

These solutions came about through the interdisciplinary efforts of a network of lawyers and social workers in Palestine, Israel and Jordan. Although these people may come from cultures long divided by conflict, they’re united by a dedication to outreach, public education and policy research. They share something else, too: They were brought together by the McGill School of Social Work.

When he founded the McGill Middle East Program in Civil Society and Peace Building (MMEP) in 1994, School of Social Work professor Jim Torczyner imagined Israelis...
Palestinians and Jordanians joining hands to build peace by promoting social justice. And so he began cultivating relationships with nine institutions that now form MMEP’s partner base: Ben-Gurion University of the Negev, Community Advocacy Israel, the Shatil empowerment and training centre (part of the New Israel Fund philanthropic effort) and Sapir College; the University of Jordan, the Jordan Red Crescent and the Jordanian Hashemite Fund for Human Development NGO; and An-Najah National University in Nablus and the Palestine Community Advocacy Network. To date, these collaborations have created eight community practice centres in the three countries. “The whole idea is to establish a regional rights-based culture,” Torczyner says, “which means all people have the same rights.”

The MMEP is based on the Rights-based Community Practice model Torczyner developed in 1975 for Project Genesis, a community-based organization serving the multi-ethnic, low-income Côte-des-Neiges neighbourhood of Montreal. Since its inception, Project Genesis has brought together volunteers from within the community and has helped hundreds of thousands of Montrealers, originating from over 130 different countries, in accessing services and fighting for their rights. In the RBCP model, the means are as important as the ends: “The right of low income people to participate in processes and decisions that affect their lives, as individuals and communities, is as important as gaining access to the rights themselves,” says Torczyner. The process is participatory, and by promoting relationships among people of diversity, especially the disadvantaged, both within and between societies, people are ultimately empowered to find common ground and create social change.

The MMEP centres follow Project Genesis’s lead by establishing accessible, storefront locations where people can consult lawyers and social workers to get help with issues affecting their social rights, such as housing, income and education. The centres’ collective goal is to implement innovative programs to promote the rule of law, equity, peace and civil society amongst disadvantaged communities coping with conflict and economic hardship. The centres assist over 120,000 people each year.

Although the centres serve their specific communities, and are mostly staffed by volunteers from within the communities, the team behind the effort reaches beyond religious and ethnic lines. The executive and management committees are made up of Canadians, Israelis, Jordanians and Palestinians—Christians, Jews and Muslims. The mix has helped develop new relationships, taking the program into uncharted territory with unprecedented results.

For example, Israel’s national emergency medical and disaster service, Magen David Adom, had been excluded from the International Federation of Red Cross and Red Crescent Societies since its creation in 1930. The reason: Its red Star of David emblem wasn’t an approved symbol and the organization wasn’t about to replace it with an acceptable cross or crescent. Dr. Mohammed Al-Hadid, president of the Jordan Red Crescent Society and an executive committee member of the MMEP, hadn’t interacted with Israelis until he became part of the MMEP. After visiting Israel and witnessing Magen David Adom’s operations, however, he began lobbying on behalf of the organization. The International Committee of the Red Cross adopted a red crystal as a third symbol identifying relief and emergency workers, and the IFRCRCS admitted Israel in 2006.

A symbol may seem like a small matter, but it has big consequences. Under the Geneva Convention, relief workers and vehicles identified with Red Cross-approved symbols must be granted unimpeded access to people in need. The red crystal means Magen David Adom now shares this privilege—and lives will undoubtedly be saved because of it. “The argument is: Look, there will be an earthquake,” Torczyner explains. “It’s not going to be a Jewish, Muslim or Christian earthquake. It’s going to kill people.” He argues that to save lives, victims must be taken to the closest medical facility, even if it’s across the border. Protocols for such cooperation are being developed now. Thanks to the efforts of the MMEP, 18 Jordanian students are now studying emergency medicine next door in Israel—instead of Australia, as they needed to do in the past.

Each MMEP centre is founded and directed by a McGill graduate, and that initial connection blooms into even more connections on the ground. “It connects universities with practice and practice with real people,” Torczyner says. Jimmy Weinblatt, rector of Ben-Gurion University and member of the MMEP executive committee, agrees. “It is extremely important to develop this kind of grassroots cooperation,” he says, “that eventually will be needed the

There is a very thin line between hope and hopelessness. Peace will grow with hope. If you give people hope in solving their problems, the hope will oppose this mentality of hatred and revenge.

– DOCTORAL STUDENT
SAMI KILANI
day peace comes.” The program puts people on the path to peace by giving them hope, according to Sami Kilani, a Palestinian member of the executive committee and a doctoral student in social work at McGill. “There is a very thin line between hope and hopelessness,” he says. “Peace will grow with hope. If you give people hope in solving their problems, the hope will oppose this mentality of hatred and revenge.”

The nine institutional partners are now ready to take the MMEP to the next level by building an international organization, to be headquartered in Jerusalem. McGill will remain the research and training arm of the project, the “enabling third party,” as Torczyner puts it.

Torczyner sees this development as indicative of the trust that has grown since the MMEP’s early, tentative meetings held on the neutral territory of the McGill campus. “People tested out the relationships,” he recalls, “and it wasn’t all love and friendship and peace.” There were differences in the way the parties viewed their conflicts and concerns about being seen as collaborators. “Now we’re in a position where there’s trust, respect and understanding,” notes David Leduc, the MMEP’s program manager, “and a mutual backing to this model that everyone understands and believes in.”

Torczyner says it’s the daily successes that keep him and the program going. Such as when Palestinian engineering students renovated rickety homes to make them safe. Or when a Bedouin “rights-mobile” began regularly delivering electricity, water and mail to isolated Israeli villages. Or when Palestinian hospitals hired social workers to support patients in facing their day-to-day problems. Or when an MMEP centre in Jordan squelched a proposed cemetery relocation, which would have made it difficult for mourners to visit graves. The list goes on.

Leduc credits such accomplishments to the relationships the centres and partners have developed through their subtle approach. “In many ways, their accomplishments confront the state around rights, which the governments could see as an obstacle. But they don’t.” What he finds remarkable is that there’s arms-length government support for the program, from all three countries, stemming from a belief that strengthening civil society, especially in the most disadvantaged areas, strengthens their respective nations by decreasing inequality and promoting social justice. The program itself is built on the understanding that the reduction of inequality and the promotion of civil society and social justice are intricately related to peace-building, both between and among nations.

Torczyner doesn’t plan to stop anytime soon. He’s planning 20 new centres and aims to enlist young volunteers in the next five years as part of a cross-border social movement: “Imagine having 10,000 Israeli, Palestinian and Jordanian social entrepreneurs in these neighbourhoods, pushing the same message and learning from each other!”

The McGill Middle East Program in Civil Society and Peace Building is principally funded by the Canadian International Development Agency.
Bioresource engineer Vijaya Raghavan has devoted his career to improving the harvest process and reducing food waste.
If you can’t eat it, it’s not food: Growing crops is one thing, but the real trick is getting those crops from field to market with minimal spoilage. Learn about bioresource engineering professor Vijaya Raghavan’s decades-long effort to bring post-harvest innovations to Indian farms.

By Julia Asselstine

Forty years ago, Vijaya Raghavan came to Canada to pursue his studies in agricultural engineering. His homeland of India was already two years into its “Green Revolution” (1967-1978), its solution to preventing another food shortage like the one that killed four million people in eastern India in 1943. This period saw the expansion of farming areas, the introduction to the practice of double cropping (growing two or more crops in a single space during a single growing season) and an influx of seeds with improved genetics.

India’s food production boomed. But Raghavan noticed a disturbing trend: As food production increased, so did the amount of food wasted during harvest. He decided to dedicate his research career to remediating this problem in his homeland, but quickly discovered that his work had great international significance. From the germination of an idea in his small McGill office, Raghavan grew a seed into a thriving vine of valuable knowledge that has reached developing countries crippled by poor-to-zero post-harvest knowledge. His work has taken him to fields not only in India, but in China, Malaysia, Thailand, Brazil, Costa Rica and several African nations. His impact has been enormous, as he witnessed firsthand during a recent trip back to India. As he travelled from one village to the next, he heard over and over again the success stories, new ideas and most of all the happiness in people’s voices. They can now send their children to school with full bellies, and can see a future that is bright.

“You could feed one-third of India’s poor if you captured losses each year,” says Raghavan, a James McGill Professor in Bioresource Engineering in the Faculty of Agricultural and Environmental Sciences at the Macdonald Campus. Raghavan explains that despite a large volume of food production in India, 10 to 30 per cent of grains and 22 to 40 per cent of fruits and vegetables never make it to market, costing farms $15 billion (U.S.) annually. On top of this, the costs of running a farm, including external crop processing, have risen disproportionately to the increase in sale prices. The majority of Indian farms are small land holdings and their ability to make a profit is shrinking fastest of all.

“By enhancing the post-harvest operations, value goes up,” says Raghavan. “One example is when farmers sort tomatoes into groups. Not all tomatoes are created equal, and if they all flood the market, price crashes result in unsold, rotten tomatoes. Top-quality tomatoes fetch the highest prices and low-quality tomatoes are sold for less elsewhere. Lesser-quality tomatoes can be saved for canning if the farm set up the proper facility, and the lowest-quality tomatoes yield antioxidant compounds if extraction equipment is available.”

If the gains made by the Green Revolution were to be consolidated, the issue needed immediate attention. And he knew that he could invoke positive change by collaborating with his university colleagues in India. From 1985 to 1996, he worked closely with the staff of the University of Agricultural Sciences in Bangalore on the Bangalore-McGill Post Harvest Engineering project. Funded by the Canadian International Development Agency (CIDA), the project focused on developing and delivering post-harvest technologies to many farmers, mostly women, in southern and central Karnataka State in south India. Raghavan followed this success with a second, more ambitious CIDA-funded project called the Consolidation of Food Security in South India. Between 2002 and 2007, he again collaborated with researchers at the University of Agricultural Sciences, Bangalore, as well as those at the University of Agricultural Sciences, Dharwad, and Tamil Nadu Agricultural University at Coimbatore. Their goal was to provide training as well as infrastructure, to better support sustainable operations. The strengths of the institutions were harnessed to develop food-processing solutions—such as a post-harvest technology research and training centre in Coimbatore, and several krishi
vignana kendras (KVKs, or knowledge centres)—that could be transferred to the beneficiaries as income-generating activities. In this way livelihoods could be improved and poverty could be reduced.

Within the boundaries of this project people received their own land, buildings and electricity connections. Training, machinery and the link with universities for research was provided. On the farm, staff learned farm management and applications for technology. They became more market savvy and they set up machinery for threshing, pasteurizing, canning and other operations. “By installing a threshing machine to clean grain, the quality goes up immediately and the machine pays for itself,” says Raghavan. “You need to make this sustainable at the village level. It becomes unsustainable if you just talk to the middle man and not the first-line workers.”

“The Consolidation of Food Security project in South India has provided enormous sustained benefits for the farming community and for the post-harvest processing sector of the whole country,” says Nachimuthu Varadharaju, Professor and Head, Post Harvest Technology Centre, Tamil Nadu Agricultural University. “Raghavan’s work has already made an impact for tens of thousands of people here. In the long run it will have a positive influence on millions more.”

Raghavan returned to the southern states of India this past summer and witnessed firsthand the many successes. “The farmers are now entrepreneurs themselves. They are creating new things, like more markets, and they explain to me how the activities have enhanced their quality of life,” he says. “It has become a sustainable agriculture—my mission accomplished.”

There is still, he acknowledges, lots of work to be done. Currently, graduate students in his McGill lab, for example, are collaborating with peers in India’s State Agricultural Universities on everything from drying cranberries in microwave ovens for long-term storage to processing nutritious millet so it can compete with the rice market. The Indian government is now in the process of establishing 350 post-harvest centres, which will create jobs for millions. Subodh Kant Sahay, India’s Minister of State in the Ministry of Food Processing Industries, declared this year that he wants to more than triple India’s food processing industry over the next five years, and double its share of global trade to three per cent. “After the Green Revolution, we are now ushering in the Evergreen Revolution in the country. Processing is an evergreen activity,” says Sahay. “It’s the key to the agricultural sector.”

Vijaya Raghavan’s research projects receive funding from CIDA, Canada’s Natural Sciences and Engineering Research Council and the Fonds québécois de la recherche sur la nature et les technologies.

“Not all tomatoes are created equal.”

— Prof. Vijaya Raghavan
Every two years, the Junior Nanotech Network brings together PhD students from McGill and Munich’s Ludwig-Maximilians-Universität. Nanoscience may be measured in billionths of metres, but innovation means reaching out around the planet.

By Michael Woloschuk

Given the spirited reputation of its host cities—jazzy, festive Montreal in summertime and bacchanalian, beer-drenched Munich in autumn—it is fitting that the Junior Nanotech Network was born over a shared drink, or two, at a Venice café. “Maybe it was the result of having one bottle of wine too many,” jokes Peter Grütter, James McGill Professor of Physics and Associate Dean of Research and Graduate Education at McGill’s Faculty of Science, recalling his 2005 Venetian discussion with Professor Hermann Gaub, Chair of Applied Physics at Munich’s Ludwig-Maximilians-Universität.

It turns out that Ludwig-Maximilians-Universität, Germany’s second-largest university, was interested in launching a nanoscience PhD student exchange program. “I suggested that if they came to McGill, students could host each other in their apartments and homes,” says Grütter, “and it worked.”

Dubbed a “self-organized graduate student exchange program,” the biennial Junior Nanotech Network (JNN) began in 2006; the next exchange is scheduled for July and October 2010. The network brings together ten PhD students from the McGill Institute of Advanced Materials (MIAM) and ten from Ludwig-Maximilians-Universität’s Center for NanoScience (CeNS) for six weeks of research collaboration and guest lectures. (See sidebar for examples of past projects.) Three weeks are spent in Montreal, to coincide with the city’s International Jazz Festival at the beginning of July, and three weeks in Munich during Oktoberfest. As a bonus, the Munich portion of the program takes a one-week side trip to Venice, where CeNS holds a special workshop.

The timing isn’t an accident; scheduling the exchange around world-famous cultural attractions, notes Grütter, means “we can attract almost whoever we want in terms of guest speakers.” The JNN has, in fact, featured guest lectures by such nanotech heavy hitters as Duncan Stewart (Hewlett-Packard Labs, Palo Alto) and Jürgen Urban (Fraunhofer Institute for Organic Electronics, Sensors, and Displays).
In 2005, professors Peter Grütter (top) and Hermann Gaub conceived of the Junior Nanotech Network, a biennial PhD student research exchange between McGill University and Munich’s Ludwig-Maximilians-Universität.

The Canadian portion of the 2010 edition of the Junior Nanotech Network will receive funding from the Canadian Institute for Advanced Research (CIFAR). Past editions have received funding from CIFAR and Quebec’s ministère des Relations internationales and ministère du Développement économique, de l’Innovation et de l’Exportation.

Alto), Martin Moskovits (University of California, Santa Barbara) and Mark Reed (Yale) — but the real stars of the program are the students themselves, who conceive, teach and supervise the scientific experiments. Lab work is carried out by guest students under the supervision of host students, which allows for the broadest transfer of knowledge and new technical skills.

The field of nanotechnology looks at controlling matter at the atomic level, which allows researchers to build structures 100 nanometres or smaller. (One nanometre equals one billionth of a metre.) Applications include nanoelectronics (such as read heads in hard disk drives), nanomedicine (new cancer drugs, based on heating gold nanoshells with a tissue-penetrating laser, are in clinical trials) and optoelectronics (incandescent lighting is responsible for 20 per cent of world energy consumption, but new white-light-emitting nanodot-based LEDs promise to reduce that number to a mere 0.2 per cent). At the atomic scale, the traditional boundaries between physics, chemistry, engineering and the life sciences vanish—as a result, nano research demands that scientists trained in many different disciplines join forces in a strong international network.

“The exchange program made me see that no matter where you work in the world, there will be similarities and differences,” says Emily Cranston, a participant of the 2006 Junior Nanotech Network who went on to receive her PhD in Materials Chemistry and is now doing postdoctoral studies at the KTH Royal Institute of Technology in Stockholm. “Similar because you have to be self-driven, level-headed, patient and meticulous always in science, while the differences make you see all the excitement and impact and the things that you still needed to figure out. You really can’t overestimate the power of being able to talk to someone else, somewhere else, who actually understands your research.”

Cranston, whose Junior Nanotech Network project involved using DNA as an architectural component in the assembly of nanoparticles, credits the exchange program with showing how her research fit into the bigger picture and with clarifying the role of an interdisciplinary outlook in science. “The exchange program features prominently on my CV for three reasons,” she explains. “One, it shows acquired skills and ‘nano-techniques’ in a broad range of subjects. Two, it shows that strong networks and collaborations with other people and institutions is very useful. Finally, it demonstrates organizational skills, self-motivation and enthusiasm.”

All of which is music to the ears of Grütter, who envisioned precisely this kind of thinking when he conceived the idea of instilling a motivating element into the exchange program. “The fundamental thing is to expose students to nanoscience—but not with made-up projects,” he says. “Furthermore, students must host each other to keep costs down, and they must organize themselves: prepare projects, organize workshops and prepare the hosting experience.”

Does Cranston recommend the program to other students? “I do recommend it, I have recommended it, and I will continue to do so,” she says. “However, it is serious, it takes time, it will slow down your research progress, it will be difficult to explain to your boss—and if you don’t like meeting and interacting with new people out of your comfort zone, then you won’t like it. Other than that, you’ll never forget it.”
Sweating the small stuff

The third edition of the Junior Nanotech Network, to be held in 2010, promises to continue the student exchange’s tradition of cutting-edge research. During the 2006 and 2008 sessions, PhD students from McGill and Ludwig-Maximilians-Universität (LMU) collaborated on projects such as:

**Third Harmonic Generation of Gold Nanoparticles**. Led by McGill student Jonathan Bélisle, this project used a multiphoton laser-scanning microscope to image gold nanoparticles on glass. Bélisle’s work proved relevant to his subsequent research with McGill chemist and physicist Paul Wiseman on developing a groundbreaking new malaria detection technique.

**Stretching Biological Polymers in Optical Tweezers**. Melanie Reisinger and Philipp Feldpausch from LMU directed a team whose goal was to give insight into the stability of different types of optical tweezers, used to manipulate individual molecules attached to a micrometre-sized bead.

**Organic Semiconductors**. Led by Martin Huth of LMU, this project helped reveal the semiconducting properties of aromatic hydrocarbons, which has implications for developing products such as flexible displays.

**Synthesis of Gold Nanoparticles**. Adil Kassam from McGill drove this exploration of different methods of growing gold nanoparticles (two to 50 nanometres wide), which are used as optical labels in cell biology and as very effective catalytic converters.

**Antibacterial Effects of Silver Nanoparticles for Water Purification**. McGill student Theresa Dankovich led this demonstration of how silver nanoparticles, a known bactericide with low toxicity to humans, can be incorporated into a paper water filter.

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Above: This ultra-high-vacuum atomic force microscope, located in the basement of McGill’s M.H. Wong Building, is used to characterize and manipulate samples on an atomic scale.

At left: While doing her PhD studies in materials chemistry at McGill, Emily Cranston participated in the 2006 Junior Nanotech Network in Venice, Munich and Montreal.
In 1992, researchers at the Montreal Children's Hospital and six U.S. institutions began a long-term study of treatment for Attention Deficit Hyperactivity Disorder (ADHD). The project builds on a previous collaboration between Dr. Lily Hechtman, a McGill professor of psychiatry and pediatrics based at the Children's, and New York University psychiatry professor Howard Abikoff, this time expanding their research to a much broader population. With the inclusion of researchers from across America—Duke University, Columbia University, Mount Sinai Medical Center, the University of California at Berkeley and Irvine, and the University of Pittsburgh—the current study follows multimodal treatment of 579 children diagnosed with ADHD. The children, 7 to 9 years old when the study began, were randomly assigned to four treatments: medication, behaviour therapy, a combination of the two, or community care. The study, which will run until at least 2013, has yielded dozens of publications, and new insights into the overwhelming benefits of combining medication with psychosocial treatment.

Why is it necessary to partner with seven other research institutions for this kind of study?

When you’re doing very comprehensive interventions, you need a large number of patients. By doing concurrent research at multiple sites, you can gather the sample much more quickly. A very diverse patient population also helps the findings apply across the board, regardless of race or socio-economic class or other factors—or you can see in what way specific factors may affect your results. We’ve already seen, for example, that children living with one parent, versus two, are generally at some disadvantage for effective treatment.

How present was the NIMH in this process?

Very active. They sat at the table all the time, and could see when the process was being derailed, and would talk to people privately: “You either collaborate, or you’re out.” They were committed to this project and wanted it to succeed. That was the first time they took this multi-site approach, and they’ve done it subsequently so I think they’ve learned from our experience that it’s feasible.

Once you’d established uniformity for admission to the study and treatment, did everyone scatter?

No. Initially, there was a weekly conference call to deal with different things: medication issues, implementation issues, whether a child met the criteria for being admitted to the study. And there is still a lot of collaboration and consultation. Let’s say I think I need to increase a certain patient’s medication. I have to present that case to the psychopharmacology board, made up of psychopharmacologists from each research centre. It provides better treatment for the patients because you can draw on the expertise of all these experienced people.

What qualities make for a good research partner?

This past November, we had a Canadian Academy of Child and Adolescent Psychiatry meeting in Toronto, and one of the speakers was Jim Swanson, who’s the head of the UC Irvine site. I introduced him and said we’d been working together longer than many marriages! It made me think that what makes for a good research partnership is similar to what makes for a good marriage: trust, mutual respect, a sense on all sides that every one’s contributing. Then there’s a sense that if I’m stuck, someone will help me out—and I’d help them out. And if you like each other on top of all that, it’s a bonus.

That doesn’t sound easy.

It was a very difficult process that took about a year. In the end, the process selected out the people who can work collaboratively. But there was a lot of good will, and we came up with one proposal, and it’s been carried out in the same way in all the sites.

The Multi-site Multimodal Treatment of Children with ADHD Follow-up Study is funded by the U.S. National Institutes of Health.
In 1969, nursing research in Canada was so young that it didn’t have its own scholarly journal. Moyra F. Allen, director of the graduate program at McGill’s School of Nursing, took issue with this omission—so she filled the gap with the first in what would become an erratically published, yet trailblazing, series of slim volumes called Nursing Papers. Allen retired in 1984 and her pet project fell to new editor Mary Ellen-Jeans, who changed the name to the Canadian Journal of Nursing Research and introduced a peer-review process. By 1992, the CJNR was flagging, but McGill nursing professor Laurie Gottlieb recognized the importance of keeping the groundbreaking journal alive. “You want to base practice on the best evidence,” she explains. “A research journal plays an important role: to provide that best evidence, to provide guidelines for best practice.” Gottlieb stepped in as editor-in-chief.

Gottlieb’s initial challenge was figuring out “how to remain a general research journal while focusing on emerging areas. Rather than choose one approach over the other, I decided to combine the two by giving each issue a focus topic with a guest editor.” Theme issues have tackled topics such as loss and bereavement, home care, gerontology and chronic illness management.

The CJNR, which Gottlieb notes is still “a very lean operation,” now comes out quarterly (print and electronic) and is a widely indexed and respected publication. “Nursing scholarship has really become quite formidable,” she says. “We’re seeing an evolution in the research. Some topics repeat every five years in the journal, and show a progression—from a general discussion about women’s health to determinants of women’s health, for example. It shows the progression of the field.”

Celebrating its 40th anniversary, CJNR is one of the few nursing journals focused on research, not practice. (A far cry from the publishing world of 1969, there are now an estimated 400 nursing journals; 50 or so are research-focused.) “It’s been great to see how nursing has evolved and been transformed in the past 40 years,” Gottlieb notes. “I think people are beginning to recognize that if you don’t have well-qualified, well-educated, experienced nurses, the whole health care system is put in jeopardy. A good nurse is someone who has a lot of experience, knows how to think, and who has a solid, broad knowledge base. That’s where our journal comes in: to provide some of that knowledge.”

The Canadian Journal of Nursing Research receives funding from the Social Sciences and Humanities Research Council. Laurie Gottlieb is the Flora Madeline Shaw Chair in Nursing at McGill, and the 2009 recipient of the Order of Merit from the Ordre des infirmières et infirmiers du Québec.

Forty years ago, Moyra F. Allen (left) founded Nursing Papers to fill a gap in the academic literature. Now called the Canadian Journal of Nursing Research, and edited by Laurie Gottlieb (right), the journal is a widely indexed resource.
Behind every great discovery is a great team

McGill University is proud that three of our recent research breakthroughs ranked in the Québec Science top ten Discoveries of 2009.

**TELECOMMUNICATIONS**: using “colloidal quantum dots” to amplify fibre-optic light transmission
*Patanjali Kambhampati*, Department of Chemistry

*Ryan Cooney*
*D.M. Sagar*
*Sam Sewall*

**MEDICINE**: a groundbreaking experimental treatment for multiple sclerosis
*Jacques Galipeau, Moutih Rafei*, Faculty of Medicine and the Lady Davis Institute of the Jewish General Hospital
*Elena Birman*
*Marie-Noëlle Boivin*
*Kathy Forner*
*Jeremy Hsieh*
*Mengyang Li*
*Claude Perreault*
*Yoon Kow Young*
*Simone Zehntner*

**NEUROSCIENCE**: the connection between childhood abuse and adult suicide risk
*Michael Meaney*, Departments of Psychiatry and Neurology and Neurosurgery, and the Douglas Mental Health University Institute
*Patrick McGowan, Moshe Szyf*, Department of Pharmacology and Therapeutics
*Gustavo Turecki*, Department of Psychiatry and the Douglas Mental Health University Institute
*Benoît Labonté*
*Aya Sasaki*

**Congratulations to our teams for their outstanding work!**

These revolutionary findings are only possible through the combined efforts of faculty members, graduate students, postdoctoral fellows and research associates—from McGill, our affiliated hospitals and partner institutions.