

# MATTERS

RESEARCH

making better legal decisions

colorectal cancer research project

big land adventure

impact of covert wartime operations

sex and the student

## WORKPLACE AGGRESSION

preventing an anger explosion in the workplace

# Moving research.

Knowledge Mobilization (KM) is an emerging discipline in universities throughout the world. KM can be defined as a two-way communication between researchers and community at the beginning of research, and throughout a research project.

But why should the average person care about KM? Because research has the potential to create cultural, social and economic benefits for our communities. Research can benefit the individual by the development of pharmaceuticals to help offset the effects of a disease or a group of individuals, by bringing about a policy or program change.

Knowledge Mobilization or information sharing is also about action. The key is to produce reliable results and put them into action. It also means that researchers have to describe their research in plain language, eliminating the jargon that creates a barrier to communities' use of the results. And it means that relationships need to have been built from the outset with relevant stakeholders, whether they are business leaders, medical professional, policy makers, program administrators or professional associations, to determine their needs and priorities – so they can be looking for the information and are prepared to act on the evidence provided to them.

For researchers at Memorial sharing knowledge is an important aspect of their work. In this issue of *Research Matters*, you will find stories about research at Memorial that is making difference to the lives of our people from dealing with workplace aggression to awareness about colorectal cancer. Finally, in this issue you will find a story on the Leslie Harris Centre for Public Policy which is leading the country in developing new models for sharing knowledge and is helping Memorial build as strong KM culture.

As always, we are happy to hear your comments on this issue of *Research Matters*.

Deborah Inkpen

A handwritten signature in black ink that reads "Deborah Inkpen". The signature is written in a cursive, flowing style.

Editor

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Research Matters is published by the Division of Marketing and Communications for the Office of the Vice-President (Research). Versions of some articles have previously been published in Memorial's Gazette.

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# HARNESSING THE POWER

## Research program focuses on teacher practices and technology

by Deborah Inkpen

**A MEMORIAL UNIVERSITY RESEARCHER** is looking at how teachers can harness the power of information and communication technologies – Dr. Elizabeth Murphy, Faculty of Education, is undertaking a program of research on teacher practices in contexts of technology use.

Dr. Murphy received a grant for \$50,000 from the Official Languages Research and Dissemination Program which is a Strategic Joint Initiative of the Social Sciences and Humanities Council (SSHRC) and the Department of Canadian Heritage. This one-year research project will focus on teacher practices, in a context of teaching French, using online real-time communication technologies.

Dr. Murphy is also the recipient of two other SSHRC awards. She is the principal investigator on year two of a \$97,000, three-year study of e-teacher practices in high-school distance education. As well, she is a co-investigator in the Community-University Research Alliance (CURA) on e-learning led by Dr. Jean Brown in the Faculty of Education.

Dr. Murphy's program of research involves emerging technologies which she argues are unlike the technologies of the past, "Today's tools are extremely powerful!" said Dr. Murphy. "They are cognitive tools. They can amplify our thinking skills. I'm interested in how teachers harness that power so that teaching and learning also become very powerful."

"With this latest project, I'm focusing specifically on using technology to help teachers teach French." To conduct her study, Dr. Murphy will be relying on a real-time or synchronous communication and collaboration environment called Elluminate Live, "I choose E-Live because it's already being used in distance courses in high schools across the province as well as in some courses here at Memorial."

“Today’s tools are extremely powerful! They are cognitive tools. They can amplify our thinking skills.”



“Although there’s some evidence technology can play a role in language learning, there’s not a lot of empirical evidence to show how it does this,” Dr. Murphy explained. “We know that risk-taking and affective factors such as confidence and motivation play a facilitative role in language learning. At the same time, we have evidence that some individuals exhibit more risk-taking behaviours as well as higher confidence, motivation and engagement levels when communicating online. So my question is: How can we take advantage of online communication technologies to support language learning?”

Dr. Murphy’s research is premised on the assumption that the answer to that question lies in investigating teachers’ practices: “I’m interested in identifying what types of teacher practices and behaviours maximize the capabilities of the technology to strengthen students’ speaking skills in French classes.” Dr. Murphy will conduct her research, including all observations, interviews

and interactions with and between teachers, using online information and communication technologies. This approach will provide her with an opportunity to simultaneously explore how technology can help teachers advance their practice through online collaboration and sharing.

“My research is not techno-centric. My focus is on the teacher. We know from the “no significant difference phenomenon” – a meta-analysis of hundreds of studies of technology and media used in education contexts – that it’s not the technology but how it’s used that makes a difference in learning. The technology is not the determinant. What’s important is how the teacher integrates the technology into existing practices so that those practices are transformed and made more effective. The teacher plays a pivotal role in determining how and if we can harness the power of the technology to make teaching and learning equally powerful.” ■



▲ Dr. Elizabeth Murphy (left) with CDLI teacher, Andrew Mercer (on screen) and Dr. Andrea Rose, Faculty of Education



# What's bred in the bones of Baikal?

by Leslie Vryenhoek

**A POST-DOCTORAL FELLOW AT MEMORIAL UNIVERSITY** is working to solve a millenniums-old mystery buried on the shores of the world's oldest, deepest and most voluminous lake.

Dr. Angela Lieverse, a bioarchaeologist, is one of dozens of researchers worldwide who are trying to unravel what happened to an entire population that dwelled on the shores of Lake Baikal in southern Siberia about 7,000 years ago.

Dr. Lieverse said this mid-Holocene group of hunter-gatherers left an archaeologically rich record because, unlike most of their contemporaries, they created cemeteries, some containing graves with hundreds of artifacts. However, during a 700 year period the archaeologists call "the hiatus", the inhabitants declined in number and dramatically changed their mortuary practices. Then they disappeared and a new population – biologically and culturally distinct from the first – emerged in the same area.



Photo by Caroline Haverkort



“Something happened. The question is: where did those first people go and why, and where did the new people come from?” said Dr. Lieveise. She is among the almost 50 people worldwide – including experts in bioarchaeology, genetics, behaviour, ethnography and environmental context – who are working to answer that question.

The Baikal Archaeology Project is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC) and led by the University of Alberta, where Dr. Lieveise obtained her master’s degree. She subsequently completed a PhD at Cornell before choosing to do her two-year post-doctoral study at Memorial.

“There was no warfare. You would see all kinds of evidence of that on skeletons.”

Her piece of the Baikal puzzle is to assess the health and behaviour of the pre- and post-hiatus populations by examining teeth and bones. She’s looking for discrepancies between the two groups, and clues that might shed light on why the first population disappeared.

So far, her study of the remains of 308 individuals has ruled out some obvious possibilities, such as famine, epidemic and warfare.

Examining tooth enamel is one of the ways Dr. Lieveise makes her determinations. Enamel, she explains, forms in childhood and never modifies, so stresses like illness or malnutrition in youth are recorded permanently on the teeth. While she has observed slightly more evidence of stress on the enamel of pre-hiatus remains, she notes this isn’t significant enough to explain the disappearance of a population; rather, it’s likely the result of dietary factors. It’s known the pre-hiatus population depended on fish while the post-hiatus people ate more meat, as evidenced by skeletal

nitrogen values, as well as by the fish hooks and spears that have been uncovered.

Dr. Lieveise’s research has also ruled out violent confrontation. “There was no warfare. You would see all kinds of evidence of that on skeletons,” she says. In fact, only three of the individuals she examined had been impacted by weapons, and only one of those – a spear wound to the head – appears to have been fatal.

“My research shows that these people were really healthy in terms of other populations,” Dr. Lieveise said. “On average, both populations did very well compared to other hunter-gatherer peoples around the world, and much better than those in agricultural communities.”

That’s not surprising, given that Lake Baikal contains about 20 per cent of the world’s total unfrozen freshwater, making it home to a rich and diverse ecosystem where fish, aquatic mammals and large ruminants are plentiful.

In addition to assessing the health of the population, Dr. Lieveise is looking at the bones for clues to behaviour. “Osteoarthritis is a degenerative joint disease that results from cumulative wear and tear,” she explained. “It can offer information on mobility and activity patterns.” For example, osteoarthritis in vertebrae would suggest heavy loads were regularly carried.

Among her most exciting discoveries was that of a male whose right arm was shrunken and atrophied, apparently paralyzed for many years. She believes his longevity indicates a level of compassion and assistance for weaker members of the community.

Dr. Lieveise said a base at Memorial puts her in close proximity with other archaeologists who are studying hunter-gatherer tribes in a coastal setting. “What I do is a really good fit with what a lot of researchers here are doing,” Dr. Lieveise said, noting that while cemeteries are an unusual feature of hunter-gatherer settlements, they have been found at sites in Newfoundland’s northern coastline. “We’re looking at the same time period, and a lot of the same issues.”



Dr. Lieveise also stressed that the work at Baikal has been sanctioned by the local aboriginals, the Buriats. Although the Buriats don't believe they are descended from those whose remains are being excavated, care was taken to have the site blessed by a shaman at the project's onset.

The Baikal project's many researchers stay in contact, and every year they come together to share their latest findings, compare notes and offer theories. Dr. Lieveise says one current hypothesis involves environment changes that forced migration. "There were some fluctuations. However, these probably didn't affect the Baikal area, but there may have been enough change further south in Mongolia to cause people to migrate north."

And that population movement might explain the very visible cairns the first Baikal population placed over graves, she added. "One common way to mark territory is to build really visible cemeteries. People do this especially when others begin to move in." Still, there's a lot of work to do to determine just what really happened 7,000 years ago in Siberia. "It's really an enigma. We haven't had that eureka moment yet."

In search of answers, Dr. Lieveise will head back to Siberia this spring to gather photographs, measurements and x-rays to expand her osteoarthritis data. "I'm now doing a more in-depth examination of the muscular-skeletal stress markers – where the muscle attaches to bone. By looking at the muscle markings left behind, we can determine what kind of activities an individual might have been doing."

And this research will do more than solve the mystery of what became of Baikal's earlier inhabitants. According to Dr. Lieveise, it will shed light on human adaptive capabilities, "This can give us a much better understanding of hunter-gatherer populations and how cultures change over time. In this region, there were two drastically different cultures, but both adapted to the same environment and lived successfully." ■



Photo by Angela Lieveise





▲ Dr. Brent Snook

# Lab to lead to better legal decisions

by Leslie Vryenhoek

**A SIZEABLE GRANT** from the Canadian Foundation for Innovation (CFI) has helped make Memorial home to Canada's first Bounded Rationality and Law Lab – a facility for innovative research into decision-making in the legal system.

Dr. Brent Snook, a professor of applied social psychology, says the updated facility offers much-needed space to accommodate a growing interest in the work he and several colleagues are doing.

“Our research is trying to understand how people involved in the legal system go about making their decisions,” explained Dr. Snook. He offers examples: a victim decides whether or not to report a crime; a police officer has to exercise discretion in making an arrest; judges determine whom to release into the community. “Given how consequential these kinds of decisions are, it’s important to ask ‘can we improve the decision-making that goes on in the criminal justice system?’”

Dr. Snook, who completed his BA in sociology at Memorial and returned to the province to join the Department of Psychology in 2004, is particularly interested in the role of heuristics in legal decisions.



Heuristics, he explained, are shortcuts in thinking, used to make decisions when time, resources, knowledge or mental capacity are limited.

“The view has long been that if you use simple heuristics, your thinking is faulty. Traditionally, the negative aspects have been overemphasized.” Dr. Snook, however, is intrigued by research coming from Germany and the U.S. that suggests heuristics can be beneficial. “We expect those working in the legal system to always be fully rational, to weigh all the evidence before making a decision. But realistically, we know there are time constraints, mental constraints and resource constraints that impact on them.”

The question that must be answered, then, is whether using mental shortcuts can lead to sound outcomes. Ultimately, he expects the research done in the Bounded Rationality and Law Lab to result in policies and practices that can strengthen various sectors of the criminal justice system.

The Royal Newfoundland Constabulary (RNC) have already begun collaborating on projects; Dr. Snook is working with RNC Inspector John House on a project to examine how managers of major investigations approach decisions.

In the examination of decision-making, Dr. Snook is joined by a diverse group of colleagues, including his graduate students, professors from Memorial and other Canadian universities, and researchers from the University of Liverpool, where Dr. Snook completed his PhD.

What the team had been missing, however, was a modern, well-equipped space that would foster innovation and collaboration with local, national and international organizations. That’s changed, thanks to the grant of almost \$153,000 from CFI’s Leaders Opportunity Fund for research infrastructure, along with \$172,000 from the province’s Industrial Research and Innovation Fund, and \$57,000 from Memorial University.

The money was used to create the Bounded Rationality and Law Lab (BRL), a space with seminar

and meeting rooms containing the latest in multifunctional digital technology for teaching, training and communicating research findings. There are also fully-outfitted offices for graduate students, and an open area with workstations and equipment where master’s and honours students studying social psychology can work and interact.

In addition to his work on decision-making, Dr. Snook also studies general forensic psychology on criminal and legal behaviours, and studies what he calls the pseudoscience that is sometimes employed by the justice system. This includes hypnosis, polygraphs and profilers.

“Given how consequential these kinds of decisions are, it’s important to ask ‘can we improve the decision making that goes on in the criminal justice system?’”

“These are often used, but there is no compelling scientific evidence that they work,” said Dr. Snook, who recently completed a study on criminal profilers.

Profilers have attained prominence in recent years, thanks to the endorsement of law enforcement agencies such as the FBI and, of course, popular television programs. However, Dr. Snook and his co-investigators found that in fact, professional profilers are really no better at predicting who might be responsible for a crime than the average person.

As with Dr. Snook’s other work, this research could have significant implications for improving our legal systems. ■



MAJOR AWARDS  
 + HARD WORK  
 =  
 BANNER YEAR FOR  
 MATH AND STATS

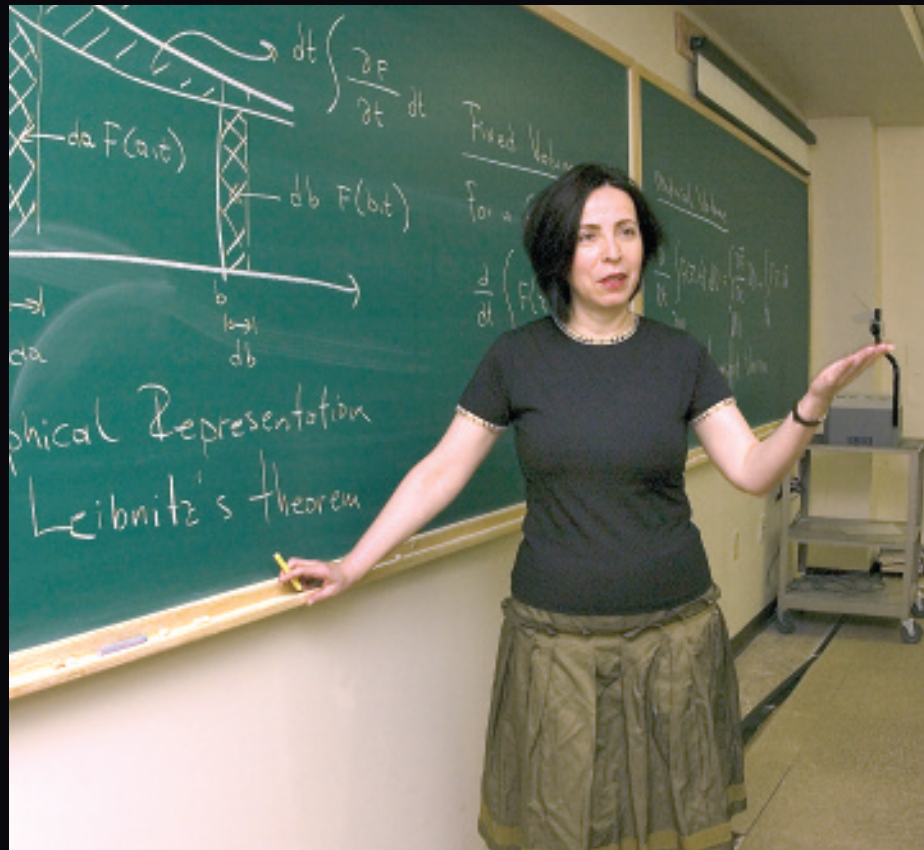
by Jeff Green

**TOP HONOURS FOR TWO OF ITS DEDICATED PROFESSORS**, prestigious medals and fellowships for several of its graduate students, and awarding its first-ever PhD to a woman, Marina Tvalavadze, capped off an impressive — and long list — of academic excellence in the spring of 2006 for one of the busiest departments at Memorial.

Now, its head is hoping all that praise will help boost his unit's profile and attract even more students.

"Such awards and achievements raise the profile of the department and Memorial," said Dr. Chris Radford, head, Department of Mathematics and Statistics. "This is particularly important in recruiting graduate students. A department which has a good reputation and profile in its various disciplines always carries more weight when its faculty are applying for grants. Success breeds success."

Helping lead the way is Dr. Serpil Kocabiyik, professor of mathematics, who was named the 2006 winner of the Arthur Beaumont Distinguished Service Award from the Canadian Applied and Industrial Mathematics Society. The honour was presented during the society's meeting in 2006 in Toronto.



▲ Dr. Serpil Kocabiyik



"The award is made to someone who has worked tirelessly to advance the cause of applied mathematics," said Dr. Radford. "A look at the previous recipients shows that Serpil's is a real breakthrough — the first award to someone outside the BC-Alberta-Ontario nexus."

Dr. Kocabiyik was the first woman to become a professor in her department in September 2005. She was also part of a three-member team from Memorial who was awarded in 2006 a Canadian Foundation for Innovation grant valued at more than \$116,000 for an in-depth project. She was joined by Drs. David Pike (lead applicant), associate professor of mathematics; and Paul Peng, associate professor of statistics, for a project titled, "Resources for Large-Memory Computational Problems in Mathematics and Statistics".

She's not the only one from the department who had reason to smile. Another of her colleagues — and a well respected member of the Memorial community — was made a fellow of the American Statistical Association at an awards ceremony in August 2006 in Seattle, Wash.

Dr. Brajendra Sutradhar is a noted Canadian researcher in statistical science and a university research professor at Memorial. Being named a fellow of the association only happens to a select few academics each year.

"This honour is awarded annually to less than one-third of one per cent of the ASA membership to recognize members of established reputation," explained Dr. Radford. "It's a big deal."

These awards, and the top prizes its students have won, all added up to a busy and rewarding time for the department.

"As you can see, we have a great group of outstanding and talented faculty and students," Dr. Radford said proudly. "It is certainly gratifying to see people rewarded for their dedication and talent."

The honours augur well for the department, too, contended Dr. Radford. His unit has gone through some rapid changes in the past decade. More than 20 of its faculty members have retired while they've welcomed some new faces, and its graduate program has expanded from just 16 students five years ago to roughly 50 students in the fall of 2006.

"The award is given to someone who has worked tirelessly to advance the cause of applied mathematics."

Dr. Radford predicts the new faculty and students they've attracted and retained will breathe new life into the department.

"I think we can expect some really great things over the next few years," he said. "There'll be a lot of scope to really boost our research strength and build our graduate program further. I am also keen to really emphasize the quality of our undergraduate teaching and build the number of students in the math and stats majors." ■



# Productivity high in colorectal cancer research project

by Sharon Gray

The sign outside the door says "Let's talk about my butt". Inside, Dr. Elizabeth Dicks is eager to talk about butts and the problem of colorectal cancer in Newfoundland and Labrador. Colorectal cancer is the second leading cause of death from cancer in Canada, and the rates of colorectal cancer in this province are 27 per cent higher than the national average.

"We're talking about 127 cases for every 100,000 people, compared to a Canadian average of 100 cases for 100,000 people," she said from her first-floor office in the Faculty of Medicine.

Since 2001 she has played a key role with the Colorectal Cancer Interdisciplinary Health Research Team, funded for a second five-year term by the Canadian Institutes of Health Research (CIHR). She's been the nurse co-ordinator of the Newfoundland section of the project and her job has included working with many of the families who have a hereditary form of colorectal cancer.

Now that she's finished her PhD, Dr. Dicks is taking on a new role with the project.

"I've asked Betty (Dicks) to be the managing director for the whole team in both provinces," said Dr. John McLaughlin, epidemiologist and team leader, based at the Samuel Lunenfeld Research Institute in Toronto. "She'll continue in her co-ordinating function at Memorial University but also serve in a more direct co-ordinating role for Ontario as well. With her appointment as a clinical scientist at Memorial she'll really be able to help lead the science and the research."

Dr. McLaughlin and other researchers and students from Ontario were in St. John's in the summer of 2006 to meet with team members at Memorial University for the annual general meeting. He said the project has already accomplished a great deal in Newfoundland and Labrador, with researchers active in all areas of the province. Funding



▲ Reproduced with permission from the Colorectal Cancer Screening Initiative Foundation





Dr. Elizabeth Dicks ▶

from the first phase of the project helped establish the Newfoundland and Labrador Familial Colorectal Cancer Registry, which collects information about newly diagnosed cancers including family health data, personal health data and biological specimens of tumour tissue and blood.

"In the first five years of the project we created this provincial familial cancer registry and we were also able to publish 31 scientific papers, which is very good productivity," said Dr. McLaughlin. "In this next phase we will continue this productivity, but it is also my hope that we will really begin to see our work have an impact on the health in the population. That is very important because the colorectal cancer rates are so high in Newfoundland and Labrador."

Dr. Dicks explained that researchers are involved in a wide variety of studies in many disciplines to understand why colorectal cancer rates are going up. "We know it's a combination of genetics, environmental factors and issues related to health services."

The research focuses in particular on people at high risk of colorectal cancer who can be identified through molecular testing or family history. The goal is to get these people into screening programs which will remove polyps before they are cancerous. Because there is often anxiety about the testing and the subsequent screening techniques, Dr. Christine Way, Nursing, has developed a method to monitor the psychosocial and behavioural impact of genetic testing for hereditary non-polyposis colorectal cancer, the most common form of hereditary colorectal cancer.

Dr. McLaughlin said studies like Dr. Way's are all part of the goal to make better information on colorectal cancer available to more people. "By helping people to understand the role that genetics can play in this disease, we can work towards improving screening, plus better and more standardized clinical care."

Other studies are looking at diet. "We know that diet is associated with colorectal cancer rates world wide," said Dr. McLaughlin. "We will be exploring this in more detail – it might be that while there is a genetic component to colorectal cancer, there might be some things that can be done for prevention. Typically the guidelines relate to a healthy diet with lots of fruit and vegetables and that is probably true, but we will also be comparing other aspects of diet such as red meat and alcohol consumption."

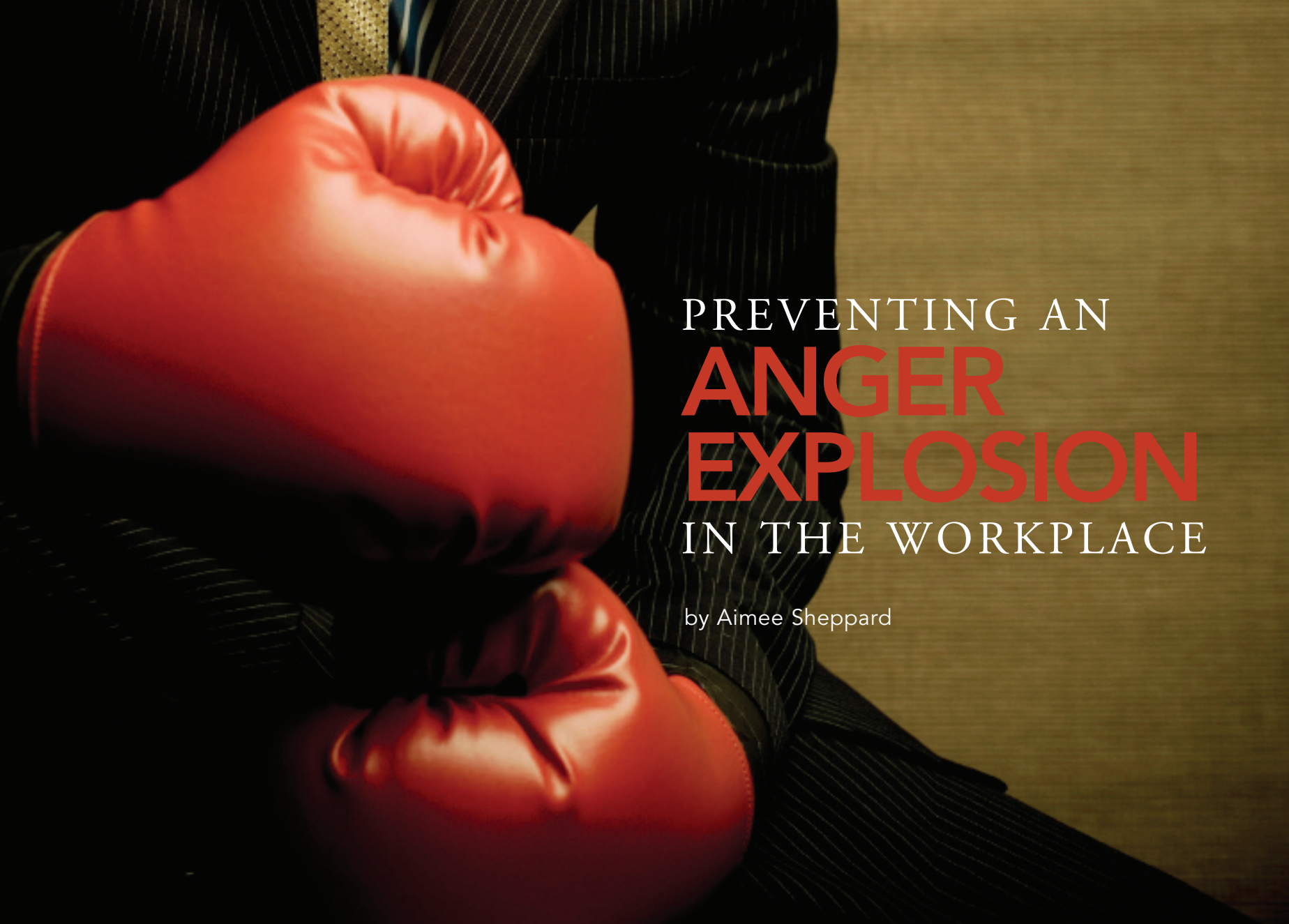
**"We're talking about 127 cases for every 100,000 people, compared to a Canadian average of 100 cases for 100,000 people."**

Having a familial cancer registry is valuable for Newfoundland and Labrador because it is a "great resource for researchers," noted Dr. Dicks, "We've joined the co-operative family registry in the U.S. so we can add power with more numbers. Because of our genetics, many people are interested in studying our population. It's a ripple effect – we started small with just our own little cancer registry and now it's recognized as a valuable tool for researchers around the world."

There are currently 42 investigators involved in the Colorectal Cancer Research project, based mainly in Ontario and Newfoundland and Labrador. There are 14 researchers at Memorial plus lead investigators and management committee members Drs. Patrick Parfrey and Ban Younghusband of the Faculty of Medicine.

The interdisciplinary, multi-site study of the causes and impact of the colorectal cancer research project was first funded in 2001 with \$5 million over five years from the Canadian Institutes of Health Research. ■





# PREVENTING AN **ANGER EXPLOSION** IN THE WORKPLACE

by Aimee Sheppard

If someone is staring over your shoulder as you read this, you may want to politely confront them about it. Otherwise, as Dr. Kate Dupré's research suggests, you may try to reciprocate that power imbalance in some way.

Since joining the Faculty of Business Administration in 2003, Dr. Dupré has focused her research on exploring aspects of workplace aggression. "It's a fairly new discipline so there's a lot of work to do," she said. "You hear a lot about things like bullying and violent acts in the workplace which is making this research more salient for people. As well, psychological harassment legislation is now being implemented in various locations and workplaces, making it all that more important to understand it."



Workplace aggression, defined as any negative behaviour directed at an individual within an organization or an organization itself, which the target is motivated to avoid, can have a negative effect on an individual's health and well-being. Its manifestations run the gamut from minor acts like spreading rumors or damaging property to the more severe violent acts of causing physical harm, even death.

"Most of what we see are verbal, psychological types of aggression," said Dr. Dupré. "Some critics argue that it's not really serious if it's not physically violent; however, research supports that the verbal and psychological type of aggression is often more problematic. Evidence also suggests that those types of behaviour can escalate to more serious types."

"Whenever a serious act of violence is reported in the news, it is often the result of a series of less serious incidents that were never really dealt with. Not all minor incidents of workplace aggression are going to lead to major ones but if there are possibilities, to me, it makes sense to try to prevent them from happening."

She and co-author Dr. Julian Barling, from Queen's University, explored how subordinates' expectations of the work environment and perceptions of supervisory control impacted on feelings or acts of aggression toward their supervisors. They compared the factors that can lead to and prevent workplace aggression in doctoral students and correctional service guards.

According to Dr. Dupré, perpetrators of workplace aggression can be found in any organization. "The evidence shows that while some individuals are more likely to be aggressive, it's the context of a situation that brings out aggression in people from whom you might not expect it. For example, if a person is treated unfairly enough or feels over- or under-controlled, this could potentially lead that person to become aggressive."

The results were published in an article titled "Predicting and Preventing Supervisory Workplace

Aggression" in the *Journal of Occupational Health Psychology*. Psychological aggression toward supervisors is positively associated with physical acts of violence directed at supervisors, supporting the notion of an escalation of aggressive workplace behaviours. Another key finding from the research is that employees' perceptions of organizational sanctions against aggression play an important role in preventing workplace aggression. "If employees believe that there are policies in place - policies with teeth - in the sense that employees believe the organization will actually take action to discipline individuals who engage in acts of aggression, then they are less likely to behave in an aggressive way."

**"You hear a lot about things like bullying and violent acts in the workplace."**

Earlier work in the field has examined workplace aggression in more general terms. However, this study explored aggression specifically directed at supervisors. The results can be used to help train supervisors and employees to better interact with one another.

In particular, the findings reinforce the need for supervisors to balance and adjust their methods and levels of supervision.

Dr. Dupré is also lead author on an article about teenagers and workplace aggression. In April 2006, she received the Dean's Award for Research Excellence. ■





# Threats to coastal ecosystems

by Deborah Inkpen

**NON-INDIGENOUS AQUATIC SPECIES** are introduced into Canadian waters through the discharged ballast water of commercial ships. This common occurrence is the leading cause of biodiversity loss in lakes, and a growing concern to aquaculture in Canadian coastal ecosystems.

Dr. Richard Rivkin of Memorial's Ocean Sciences Centre is a principal investigator in the Canadian Aquatic Invasive Species Network (CAISN), a newly-funded Natural Sciences and Engineering Research Council (NSERC) Research Network that is studying the introduction and fate of these aquatic species in both Canadian lakes and marine waters on the east and west coasts of Canada.







# BIG LAND ADVENTURE

by Deborah Inkpen

**WHEN CBC'S POPULAR SCIENCE TELEVISION SERIES, *The Nature of Things*** came knocking on geologist, Derek Wilton's door, he was more than a little enthusiastic. "What a phenomenal opportunity, not only for me and my colleagues but for the university. Having a film production crew follow you around with a camera in your face all the time was a real "eye-opener" but a lot of fun and a great adventure."

Wilton was initially contacted by the CBC in November 2005 about a five-part series they wanted to do on how the earth works and the geology of the Canadian Shield.

"I guess they wanted to get a different perspective on the shield," related Dr. Wilton. "Most people know about Northern Ontario and Quebec – the CBC wanted to do something on the Torngat Mountains in Labrador and somehow they had heard about the work I had been doing there. So they contacted me to see if I was doing anything up there this summer because they wanted to get a film crew to tag along on an expedition."







The CBC subcontracted the production company, Tutti Fuiti Films out of Montreal to work on the segment in the Torngats. “Yanick Rose from the company came down in May just to scope it all out to make sure it was a credible,” said Wilton. “He went away and created his story-line for the show based on what we showed him. The production crew previously had to pitch the story to the CBC back in April and CBC came and said ‘yeah, let’s go for it, we want to have that’. By May we knew it was a go.”

Rounding out Wilton and the film crew were fellow geologist Dr. Paul Sylvester from Earth Sciences and the Inco Innovation Centre (IIC); undergrad student Angie Paveley, who’s working in the laser ablation lab in the IIC and a former student of Dr. Wilton’s who is now working with Altius Resources; an exploration company who have extensive interests in Labrador; Lawrence Winter; and finally, Wilton’s old friend and colleague from the Smithsonian Institute, Dr. Stephen Loring, the renowned archaeologist.

Dr. Loring has been working with Wilton on Ramah chert, a unique rock found in the Ramah area of Labrador, part of the Torngat Mountains. The Maritime Archaic Indians, the first people that lived in the province, had been using the Ramah chert as a stone tool about 4,000 years ago.

Archaeologists have found artifacts made from the stone as far south as New England. “Stephen and I have been working to fingerprint even older 10,000 year old artifacts to figure out whether they came from Ramah,” said Dr. Wilton. “He came along on the expedition to give the human perspective on the geology of the Torngats – to show the connection to the people who have passed through the region and broaden interest in the show.

The film crew also wanted to capture the adventure of an expedition to the far north. Wilton said, “They were quite taken with flying up there in a small plane and what’s its like to be a geologist in the field. It was great because now people will see what we do. We can tell people we collect rocks but that tells them very little. In the film, we talked about the science behind our work; I hope it will make people interested in geology. It will also show people what a great place Labrador is.”

The premise of the segment on Wilton and his group concentrates on the science of mountain building. “One of the themes of the show is time – time to geologists is really important,” said Dr. Wilton. “We were trying to see if we could find some of the oldest minerals on the planet in these rocks from the Torngat area. These are the oldest rocks that people will see in this whole series. The crew





“Having a film production crew follow you around with a camera in your face all the time was a real “eye-opener” but a lot of fun and a great adventure.”

were interested in that because the rest of the series will segue from older to younger rocks. It will also introduce people to how we date rocks and figure out their ages.”

“The other theme is mountain building. The Torngats are mountains right now but as geologists we can see that they were mountains probably three or four times before that. The idea is that mountains rise, then erode and rock gets transported somewhere else and is incorporated into new rocks and new rocks turn into new mountains. So it’s about the cyclicity of mountain building and the movement of the Earth’s crust or surface, so-called plate tectonics. This is the fundamental theory of geology which suggests that the Earth’s surface consists of a series of plates that are in constant movement. Where the plates crash together, mountains are formed. The Himalayas, for instance, formed where the Indian plate smashed into the Asian plate. The Torngat Mountains are one of the best places on the planet to see this because the rocks are so well exposed due to the fact that no vegetation will grow there and the mountains rise directly out of the ocean. One 19th century geologist who worked up there once said, ‘the rocks revel in their freedom’. I think that’s perfect.”

The show will air in September 2007 on the CBC main network and will also be aired on Radio Canada, The Discovery Channel in the US and NHK in Japan. ■



# EXAMINING THE IMPACT OF COVERT WARTIME OPERATIONS

by Leslie Vryenhoek

**THE NEW HEAD OF MEMORIAL'S DEPARTMENT OF GERMAN AND RUSSIAN** is an advocate of skepticism. In fact, Dr. Erwin Warkentin believes it's crucial to question official sources of information.

His message to beware messaging may seem incongruent coming from a long-time academic administrator — before joining Memorial last year, Dr. Warkentin was the director of Campus Manitoba, a consortium of post-secondary institutions — but it's in keeping with his research. Dr. Warkentin is studying propaganda and the covert dissemination of misinformation to foes, a strategy known as “black ops.” In particular, he focuses on Allied operations in Germany during and after World War II, although he notes the topic is relevant to current conflicts in which western powers are engaged.

“We have to be suspicious of what governments tell us, and we have to be careful of what we're telling others. Sometimes, an awful lot of damage can be done, and we might not realize the full implications for a long time,” Dr. Warkentin said.

During WWII, he explained, the British and U.S. forces engaged in complex activities to sway support, start rumours and destabilize German society. One of their tactics involved dropping material from planes — things such as forged ration





cards and horoscope booklets, printed to look as if they'd been made locally, that warned of worsening fortunes.

Aided by intense information-gathering, personalized attempts at suasion were also employed. Radio broadcasts were designed to have a ring of personal authenticity, and misleading letters were sent to the loved ones of fallen soldiers.

Dr. Warkentin noted the efforts carried on for years after the war, too, when Allied powers created various incarnations of what the Americans called the Information Control Division in Germany. "They controlled what was allowed to be published — not just in the realm of news media, but also the cultural productions, the novels and radio plays."

That tight control, which included careful selection of who could be involved in any sort of publishing venture, is documented in meeting minutes until 1953. The impact, Dr. Warkentin asserts, continues today.

"[Those activities] may be one of the underlying causes of the xenophobia that some people still find in Germany today," he said.

The lingering influence can also be seen in the controversy that arose this year when acclaimed author Günther Grass admitted to being a member of the Waffen-SS as a teenager. Because Germans were persuaded for years that everyone who fought with the Nazis was equally guilty, and that ongoing castigation was a requirement, there is a legacy of secrecy and deceit, and even now, a lifetime of achievement is easily overshadowed by wartime involvement during one's youth.

The British, too, have lingering doubts about their activities after the war: "There is some regret. These activities are seen as very ungentlemanly, very unBritish."

Currently, Dr. Warkentin is editing a scholarly version of the syllabus used by the British Political Warfare Executive to train their agents. The text is only available in rough files in the Public Records office in London.

Many other archival records remain closed. The head of the black ops during the war, a Brit raised in Germany named Sefton Delmer, tried unsuccessfully to get clearance to release his memoirs in the 1970s. With Mr. Delmer's recent death, Dr. Warkentin hopes to be able to access some of those documents through his heirs. ■



“They controlled what was allowed to be published — not just in the realm of news media, but also the cultural productions, the novels and radio plays.”





# दशमहाविद्या DASHAMAHĀVIDYĀ दशमहाविद्या



Photo by Patricia Dold

▲ Dr. Patricia Dold is exploring an obscure Sanskrit text that contains the story of Sati and Śiva, and the 10 goddesses that surround them on this image from the temple at Kāmarūpa in India.

## Fellowship to aid search for ancient answers in Hindu text

by Leslie Vryenhoek

**RELIGIOUS STUDIES PROFESSOR DR. PATRICIA DOLD** has been awarded a prestigious Shastri Fellowship that will fund six months of research in India.

This is the second Shastri award for Dr. Dold, who received a doctoral fellowship in 1992.

This latest fellowship will allow her to build on that doctoral work, finishing the translation and analysis of an obscure Sanskrit text, the Mahābhāgavata Purāna. Written in north-east India between 1400-1600, the text contains 81 chapters of Hindu narratives from the perspective of Śāktism, a form of Hinduism that exalts the Goddess. The text has been the subject of little academic scrutiny, and no other researcher has perceived it as having extensive internal coherence, as Dr. Dold believes it does.

Dr. Patricia Dold's Shastri Fellowship will allow her to return to this 16th-century temple at Kamārūpa, in northeast India to further her translation and analysis of an obscure narrative text. ►



In 2008, she will spend several months in India, primarily in the ancient city of Banaras, where she hopes to work with some of the same scholars who previously helped her unravel challenging passages.

"I want to work with Indian scholars on the specific parts of the text that I have trouble with," she explained. "This is their tradition, and there are nuances in the language that don't show up in any dictionary."

In Banaras, she will also have access to numerous manuscripts of the text.

But while the scholarly resources she requires are in Banaras, the heart of her research will see her return to the state of Assam in India's north-east, and to the 16th century temple at Kāmarūpa that is crucial to her understanding of the text's origins and history.

"This is a famous pilgrimage site. It's considered a hotbed of transgressive Tantric practice and aggressive magic," Dr. Dold explained, but asserted that the site's infamous reputation does not reflect the religious practice of the majority of pilgrims.

"My work challenges that stereotype. I have argued that the *Mahābhāgavata Purāna* itself tries to correct such sensationalistic, sinister interpretations of religious practice at the site. I suspect that the vast number of people who come to the temple are ordinary devotees of the Goddess, and they come to cultivate a relationship with her."

When she visited the temple in the 90's, Dr. Dold had the opportunity to speak with temple officials, and they relayed stories that appear in the text she is working with, but in no other Hindu text. In particular, the local devotees knew the story of Satī, the refined and lovely wife of Śiva, transforming herself into the naked and wild Kālī after a fight with her husband, just shortly before her death. Kālī then divided into 10 goddesses, collectively known as the Māhavidyās. These goddesses are worshipped in separate shrines found at Kāmarūpa.

Dr. Dold was particularly intrigued by the local knowledge of this part of the story, because there are very

few copies of the *Mahābhāgavata* in existence – and no record of any in Assam, a state that was closed to foreigners until very recently.

"They knew very specific details, yet no one in the region can place this text." Dr. Dold believes this belies a strong oral storytelling tradition.

"All we have in text are these little snapshots of a vast storytelling tradition. India is the storytelling culture," she asserted, adding that Indians continue to look back at the old narratives and are now interpreting them in new media, such as film, for a global audience.

**"All we have in text are these little snapshots of a vast storytelling tradition. India is the storytelling culture."**

In future, she hopes to further explore the female relationships and sensibilities that these stories contain, and how women in the region of Kāmarūpa perceive their relationship with the goddess.

The Shastri Indo-Canadian Institute is a 40 year old organization that promotes and enhances relations between Canada and India through academic research and scholarship funding. Memorial University recently reinstated its membership in Shastri and is hoping to strengthen the university's ties with India. ■







# SEX and the STUDENT

**RESEARCH FOCUSES ON AIDS AND  
SEXUAL BEHAVIOURS OF UNIVERSITY  
STUDENTS IN INDIA** by Deborah Inkpen

Forty-seven per cent of unmarried and 67 per cent of married women reported they would be afraid to ask their sexual partners to wear a condom, even if they knew or had suspected that their partners had been engaging in risky sexual behaviour. Two-thirds of males said they would feel offended to be asked to wear one. These alarming statistics are from a recent study published in the *American Journal of Social Work in Health Care* on HIV/AIDS knowledge and sexual behaviours of university students in India.

From his small office in St. John's College at Memorial University, Dr. Paul Sachdev will overwhelm you with statistics about the growing rate of HIV/AIDS in India and people's attitudes towards the deadly virus. But what's really at the heart of Dr. Sachdev's research is his desire to put a stop to the spread of the disease that has gripped his homeland which has the second highest number of infections in the world after South Africa.

Dr. Sachdev, professor *emeritus* in the School of Social Work says that the AIDS pandemic is entering its 25th year and that the number of people living with the human immunodeficiency virus (HIV) is on the increase. In India, his findings reveal that the virus has made its way from commercial sex workers and their clients on to college campus and into the bedrooms of married monogamous wives. His study showed that students, while demonstrating a "moderate degree of knowledge" about the transmission symptomology, prognosis, treatment and prevention of HIV/AIDS, knew less about human sexual anatomy. "For example, one-third of the students did not know that HIV can be present in vaginal fluid or transmitted through semen," said Dr. Sachdev. "And despite the evidence that HIV has cut across sexual and gender boundaries, almost eight out of 10 (78.7 per cent) held a stereotypical view that AIDS is a disease of bisexual men and three out of ten thought that it is a gay disease."

Dr. Sachdev's findings also reveal that many students' perception of risk is low and tended "to show a lack of serious concern for contracting the disease". Fifty seven per cent of the students did not believe that they could get infected, because the disease belonged to immoral and sinful women and gay people. Six out of 10 male and four out of 10 female students found condoms repulsive, even though they admitted they would make themselves vulnerable to HIV infection. Dr. Sachdev also found that gender inequality played a significant role in the spread of the disease as women did not feel they had the power to insist that their partners wear condoms.

His study also showed that empathy towards those inflicted with the disease was very low; 63.6 per cent of students would not allow people with aids to fully participate in school and at work. Of great concern was that nurses, who are on the front line of aids patient care, had low level of comfort in working with the patients.

Dr. Sachdev feels that, "India's conservative society has undergone profound changes during the past two decades or so, largely influenced by television soaps, Bollywood movies and music videos that portray sexual themes. My study shows that increased sexual activity among these young students with minimum or non-use of condoms, greatly increases their exposure to the risk of HIV/AIDS infection," he said.

**"almost eight out of 10 (78.7 per cent) held a stereotypical view that AIDS is a disease of bisexual men and three out of 10 thought that it is a gay disease."**

Dr. Sachdev collected his data using an anonymous questionnaire from 1,272 students enrolled in eleven colleges located in four states in India. The questionnaire measured the students' knowledge and attitudes towards AIDS/HIV, perception of personal risk, gender equality, sexual knowledge and behaviour and condom use.

Dr. Sachdev plans to return to India to share his findings with students and faculty and to continue his research to assess the impact of knowledge and education campaign by government on university students' behaviour change in terms of prevention. His study is funded by Shastri Indo-Canadian institute as well as a grant from the university vice-president (research). ■







# REACHING OUT

the Harris Centre  
connects communities to  
Memorial University expertise

by Deborah Inkpen

On a rainy October night in Newfoundland most people choose to stay in for the night, but in the community of Bay d'Espoir, 90 people gathered at a local hotel to listen to a public forum hosted by Memorial's Harris Centre. The forum featured speakers who discussed issues relating to fisheries and aquaculture, a particularly timely subject for the townsfolk given the closure of the fish plant in neighbouring Harbour Breton.

The forum in Bay d'Espoir was one of many that the Centre holds across rural Newfoundland and Labrador to encourage open discussion about issues relating to regional policy and development such as technology, economic development, fisheries policy, health and rural governance. The Harris Centre, officially named the Leslie Harris Centre of Regional Policy and Development, is the public policy arm of Memorial University. It is tasked with co-ordinating and facilitating the university's teaching, research and outreach activities in the areas of regional policy and development.

The public forums are often followed up the next day by a regional workshop which is attended by local stakeholders as well as faculty, staff and students from Memorial. The workshops focus on Memorial's research, teaching and outreach relevant to the region. New collaboration opportunities between the university and local stakeholders are identified with the potential to build lasting linkages and partnerships. Each workshop is a day-long affair, with the morning session dedicated to informing local stakeholders about the activities which Memorial University is conducting in the region, and the afternoon session dedicated to identifying other ways in which the university can assist the region. The Harris Centre takes its business of knowledge mobilization seriously, a new buzz term in the social sciences, technically referring to a two-way flow of information between university researchers and community stakeholders. The regional workshops are a great tool for us to show the community what Memorial is doing and for us to learn what local needs are," said Dr. Rob Greenwood, director of the Harris Centre. "Knowledge mobilization is about two-way communication, researchers and community participating in dialogue at the beginning of research, and throughout a research project."

The Centre organizes four of these regional workshops per year, one in each of the province's four major regions: Labrador, Western Newfoundland, Central Newfoundland and Eastern Newfoundland. The Centre has held five regional workshops across the province since its inception in 2004, and two ran in the spring and early summer of 2007. Often senior administration of the university attend to deliver presentations on Memorial to the community.

"These events serve to keep Memorial connected to the people of the province," said Dr. Eddy Campbell, vice-president (academic). "Individuals came together from the community and demonstrate their commitment to working together to ensure the region thrives. I was

“Knowledge mobilization is about two-way communication, researchers and community participating in dialogue at the beginning of research, and throughout a research project.”



impressed with the exchange of ideas. Community participation is essential to the success of workshops. Without the passion and relentless determination of community citizens these small regions, especially rural areas of the province, would have trouble surviving.”

“The ‘Memorial Presents’ workshop and forum demonstrated that our university respects and values rural communities,” said Roxanne Notley, economic development officer with Southeastern Aurora Development Corporation: “We appreciate Memorial’s efforts to partner with the region to research and assist with plans to target key economic alternatives for the Zone.”

And the workshops are all about the action. The focus is not just to have a friendly dialogue about Memorial activities or community priorities, the idea is to roll up sleeves, sweat out the fine details and focus the discussion on tangible project opportunities.

“Memorial University is a repository of knowledge and expertise which can assist local stakeholders create sustainable regions,” said Dr. Greenwood. “The forums and regional workshops are a privileged opportunity to find out what the university is currently doing or is planning to do in the province’s many regions. They also offer a unique opportunity for regional economic development practitioners to encourage further work by the university in all regions. The Harris Centre strongly believes that Memorial University has a major role to

play in the long-term sustainability of this province. Its more than a vision for the Centre, it’s a passion to see faculty, students and staff, and community citizens sit down together, discuss together, and create together, solutions for Newfoundland and Labrador.”

“There is tremendous knowledge at the community level and it’s important for Memorial to use it,” said Dr. Greenwood. “Talking to local people renewed my belief in the sustainability of rural areas.” There are challenges to be sure but there is such commitment on the community level. It’s inspiring; we know that with the help of Memorial as another partner in the growing network, we can make a difference.”

Tracey Perry, executive director of the Coast of Bays Corporation, participated in the regional workshop in Bay d’Espoir said the workshops sponsored by the Harris Centre and the various zonal boards around the province are very important.

“We will need to find ways to sustain our fishery in an incredibly competitive global environment and find ways to explore new opportunities in aquaculture and oil and gas offshore exploration,” said Ms. Perry. “It’s workshops like this one that are going to give us a strong foundation for planning where we need to go in the next few years and for matching local opportunities with the resources Memorial has to offer. It was well worth going out in the rain.”





## THE ACTION: MAKING IT HAPPEN

Each of the Harris Centre's regional workshops is followed up with a summary report and further meetings with the community. The follow-up meetings allow the community to shape specific projects from ideas discussed in the workshops. In addition once projects have been identified, the "working group" becomes the delivery agent for implementing the projects. It becomes similar to an advisory board, guiding the Harris Centre through the implementation process. Out of every Regional Workshop comes such a working group. More than 70 projects are now being developed as a result of the workshops and they are all at varying degrees of completion. The most important aspect of developing projects is time: outreach is a slowly evolving process and projects take time to implement. "It can take up to a full year to get some of these projects into the green light stage", said David Yetman, manager Knowledge Mobilization with the Harris Centre, who is responsible for advancing these projects, "sometimes it's the right mix of partners, the right mix of champions and at times funding, and these processes take time. We are only now seeing the outcomes of the first workshop in Newtown, New-Wes-Valley, which was held December 2005. Now some nice projects are emerging." Some of the more advanced projects now happening include:

### DESIGNING A NEW FERRY FOR THE STRAIT OF BELLE ISLE (SOUTHERN LABRADOR WORKSHOP)

Three engineering students in the Faculty of Engineering are designing a new ferry for the Strait of Belle Isle. Evan Martin, a senior engineering student, is leading the project team, and is in his final year of completing an engineering degree. The project will contribute to course work in Engineering 7052, Ocean Systems and Design, a course offered by Dr. Dag Friis. Evan and his team are working with the Labrador Straits Development Corporation to investigate the ferry design and the project will be finished in July, 2007. The LSDC plans to use the report to encourage government to provide a year-round ferry service between St. Barbe and Blanc Sablon.

### SCIENCE WORKSHOP INFORMS DEVELOPMENT PLAN IN BAY ST. GEORGE

Drs. Dick Haedrich, John Gibson and Ian Fleming are all Memorial researchers interested in the Highland's River in Bay St. George. The river contains some of the largest multi-winter salmon stocks in the province. Morley Greening, of the Bay St. George Development Association (BSGDA) wants Memorial to study the river's tourism potential and assess the viability of a seasonal recreational salmon fishery there. With the BSGDA leading the way, the group met in early May 2007. At this meeting, it was decided that a "Science Workshop" with the community would set the groundwork for a development plan for the river. A planning workshop is scheduled for October, 2007.



### BUILDING FORUMS TO EXCHANGE KNOWLEDGE (NEWTOWN REGIONAL WORKSHOP)

Because of a workshop in Newtown, there was a discussion of greater access to Memorial research. Participants viewed research written for an academic audience as impractical and often complicated. The Harris Centre is working on a larger online database that will collect and "translate" academic research into "lay summaries", accessible to the community. The translated research is written in clear language and maintains the essence of the research findings. In partnership with the KEDC the Harris Centre has collected 19 studies related to tourism in Zone 14, and have included these lay summaries in an information binder (among other things) for distribution to businesses later this fall. The idea is that the access to new information from Memorial researchers may lead to new business ideas, business expansions, business improvement or improved organizational assessment and capacity.

One example of this is a project which is studying the interaction between the French and the Mik'maq in the Bay St. George Region. Dr. Angela Robinson, a new faculty hire with Sir Wilfred Grenfell College in Social/Cultural Studies (Anthropology), is connected with the Long Range Economic Development Board and other stakeholders to pursue an extension of her research among the Mi'kmaq of Nova Scotia. This is an excellent example of how an identified community need (new opportunity) was matched directly to an existing research initiative. Angela, a big supporter of knowledge mobilization, is currently conducting on-going meetings with the Ktaqamkuk Heritage Association and other stakeholders to discuss further development of the research project.

### THEATRE EXPERT REVAMPING A SUMMER LABRADOR CLASSIC (SOUTHERN LABRADOR REGIONAL WORKSHOP)

Dr. Jamie Skidmore in the Department of English is working with the Labrador Straits Historical Development Corporation to rewrite the summer classic, *Re-enactment of the H.M.S. Raleigh*, held at Point Amour each summer as a part of the Bakeapple Folk Festival. "Regional Workshops provide a great way to connect the expertise of Memorial with community need" Jamie said, "I'm excited about this opportunity". The Corporation is providing funding to assist in the enhancement of the play. The new play will debut during the annual Bakeapple Folk Festival in August (2007). Jamie has agreed to train the local theatre team using similar methods taught in one of his theatre courses at MUN. ■



## NSERC DISCOVERY GRANTS

# WINNING RESEARCH

by Deborah Inkpen

SEVENTY PROFESSORS FROM  
MEMORIAL UNIVERSITY  
RECEIVED \$7,986,429 in Discovery

Grants to support their research in the natural sciences and engineering from the Natural Sciences and Engineering Research Council of Canada (NSERC) this past May. These awards are normally paid out over five years.

NSERC is a federal agency whose role is to make investments in people, discovery and innovation for the benefit of all Canadians. The agency invests in people by supporting some 23,000 university students and postdoctoral fellows in their advanced studies. NSERC promotes discovery by funding more than 11,000 university professors every year and helps make innovation happen by encouraging about 1,300 Canadian companies to invest in university research and training. Over the past 10 years, NSERC has invested \$6 billion in basic research, university-industry projects, and the training of Canada's next generation of scientists and engineers.

Here's just a sample of some of the recent grant holders and their innovative research.







## ★ under my feet

According to Dr. Colin Farquharson, adjunct professor in Earth Sciences, “The goal of geophysics is to understand and perhaps even predict the dynamic processes that move and shape the Earth beneath our feet and to ‘look’ into the Earth to see these processes in action or their consequences.”

He’s using electromagnetic fields to remotely sensor the structure of the subsurface of the Earth to depths of tens of kilometres.

“Electric currents are inducted to flow in rocks,” explained Dr. Farquharson. “The strength and disposition of the currents depend of the rock type: metallic ores, for example, are relatively good at conducting electricity and give rise to electromagnetic fields which can be measured. From this it’s possible to extract information about the rock types in the subsurface.”

Dr. Farquharson is aiming to improve on the computer programs that are used to interpret measurements of electromagnetic field through his research project called Modelling and Inversion of Geophysical Electromagnetic Data. He was awarded an NSERC Discovery Grant in the amount of \$16,480 per year for five years.

Dr. Farquharson hopes his research will result in computer programs that provide more detailed and reliable models of the subsurface of the Earth. The programs will be of use to the mining industry, enabling new ore deposits to be found and in remotely sensing groundwater resources, geotechnical applications. His programs will also aid in determining the deep structure of the Earth’s crust.



## food for thought

The growing demand for fast, accurate and reliable quality inspection tools for the food processing industry has been driven by a number of factors; more stringent government safety standards, rising labour costs and increased consumer expectations for higher quality food products.

"In many food processing applications, human inspectors are simply too subjective and unreliable given the time allotted to perform the inspections task and the tedious nature of the work," said Dr. Nicholas Krouglicof, Faculty of Engineering and Applied Science. He is looking at image analysis tools for automated inspection in the food processing industry thanks to a Discovery Grant from NSERC.

"Computer vision is proving to be a rapid, objective and cost-effective alternative to human inspection for a growing number of food products," said Dr. Krouglicof. "However, significant technological challenges remain particularly in the case of 'natural foods' such as fish and poultry. I hope to address these challenges through the development of both computer vision hardware and image analysis tools especially for the automated inspection of natural foods."

Dr. Krouglicof feels that no single detection technology will ever adequately satisfy the requirements of the food processing industry and believes that a more promising approach is to combine (or fuse) several different images taken using various wavelengths of light ranging from infrared to ultraviolet. He has also proposed the development of an "intelligent" camera specifically designed for automated inspection in harsh industrial environments.

Dr. Krouglicof will receive \$15,000 per annum for five years for his research project, titled, Computer Vision Hardware and Image Analysis Tools for Automated Inspection in the Food Processing Industry.







## ★ hopf to it!

The research interests of Dr. Mikhail Kotchetov, assistant professor in the Department of Mathematics and Statistics, are primarily in the theory of Hopf algebras, named for the German mathematician Heinz Hopf.

Dr. Kotchetov has received a NSERC Discovery Grant for \$11,000 per annum for five years for his project, Algebras with Action and Co-action of Hopf Algebras. He is especially interested in the connections between the theory of Hopf algebras and the theory of Lie groups and algebras, which are algebraic structures that were first introduced by the Norwegian mathematician Sophus Lie to study continuous symmetry of differential equations, and later found numerous generalizations and applications in other areas.

“In modern mathematics,” explained Dr. Kotchetov, “the term algebra refers to any set endowed with operations of addition, multiplication and scalar multiplication that satisfy certain axioms (such as associative and distributive laws). In addition to the sets of real and complex numbers, familiar examples of algebras include the set of continuous functions on an interval, and the set of square matrices of a certain size.”

In the early 1940s Heinz Hopf discovered bialgebras – a new type of structure that is simultaneously an

algebra and a coalgebra. This means that the set is endowed not only with multiplication, but also with comultiplication, which can be roughly described as “multiplication backwards,” he said.

“While multiplication assigns to each pair of elements one element, called their product, comultiplication assigns to one element a sum of pairs of elements, called its coproduct,” said Dr. Kotchetov. “Bialgebras that admit a generalized inverse (called antipode) are referred to as Hopf algebras. Since their discovery in the 1940s, Hopf algebras arose in many areas of mathematics and theoretical physics: knot and braid theory, operator algebras, quantum theory and statistical mechanics, to name a few.”

The interest in the theory of Hopf algebras was greatly increased by the discovery of so-called quantum groups (which are really Hopf algebras) by V. Drinfeld and M. Jimbo in the mid-1980s. For this achievement V. Drinfeld was awarded a Fields Medal (similar to a Nobel Prize for mathematicians) in 1990. The theory of Hopf algebras also gives a new unified approach to many classical objects and problems of algebra, for example group algebras, enveloping algebras, automorphisms and derivations, and graded algebras.



## what's all the noise about?

In our increasingly industrial and crowded society, people are frequently working and living in the presence of unwanted noise. The negative impact of this noise on processing information becomes more noticeable as individuals grow older, in part as a result of age-related hearing and vision loss. In addition to these perceptual difficulties, older adults often report difficulty in remembering information. Recent research has identified a link between perceptual processes such as hearing and vision and cognitive processes such as memory and understanding conversations.

Dr. Aimée Surprenant's latest project, *Cognition Over the Lifespan*, will explore the link between perceptual and memory processes in order to determine how much of the age-related cognitive differences can be traced to perceptual difficulties and how much should be attributed to other causes. The approach will be to measure, control and explain difficulty in understanding and determine its effect on memory performance. To accomplish this, Dr. Surprenant will add various amounts of visual and auditory noise to stimuli and individual identification functions. Using identification functions, she will be able to predict memory performance.

"My long-term goal is to develop a formal, quantitative model of memory that will allow researchers and practitioners to pinpoint the areas of functioning that are critical to efficient cognitive processing," said Dr. Surprenant of the Department of Psychology. "Determining the causes of age-related cognitive declines will become more and more important in Newfoundland and Labrador as the percentage of the population over the age of 65 is projected by Statistics Canada to almost double by the year 2031."

Dr. Surprenant received an NSERC Discovery Grant in the amount of \$25,745 per annum for five years for her project. ■





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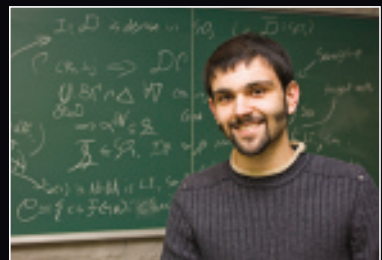


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