SCIENCE
contours
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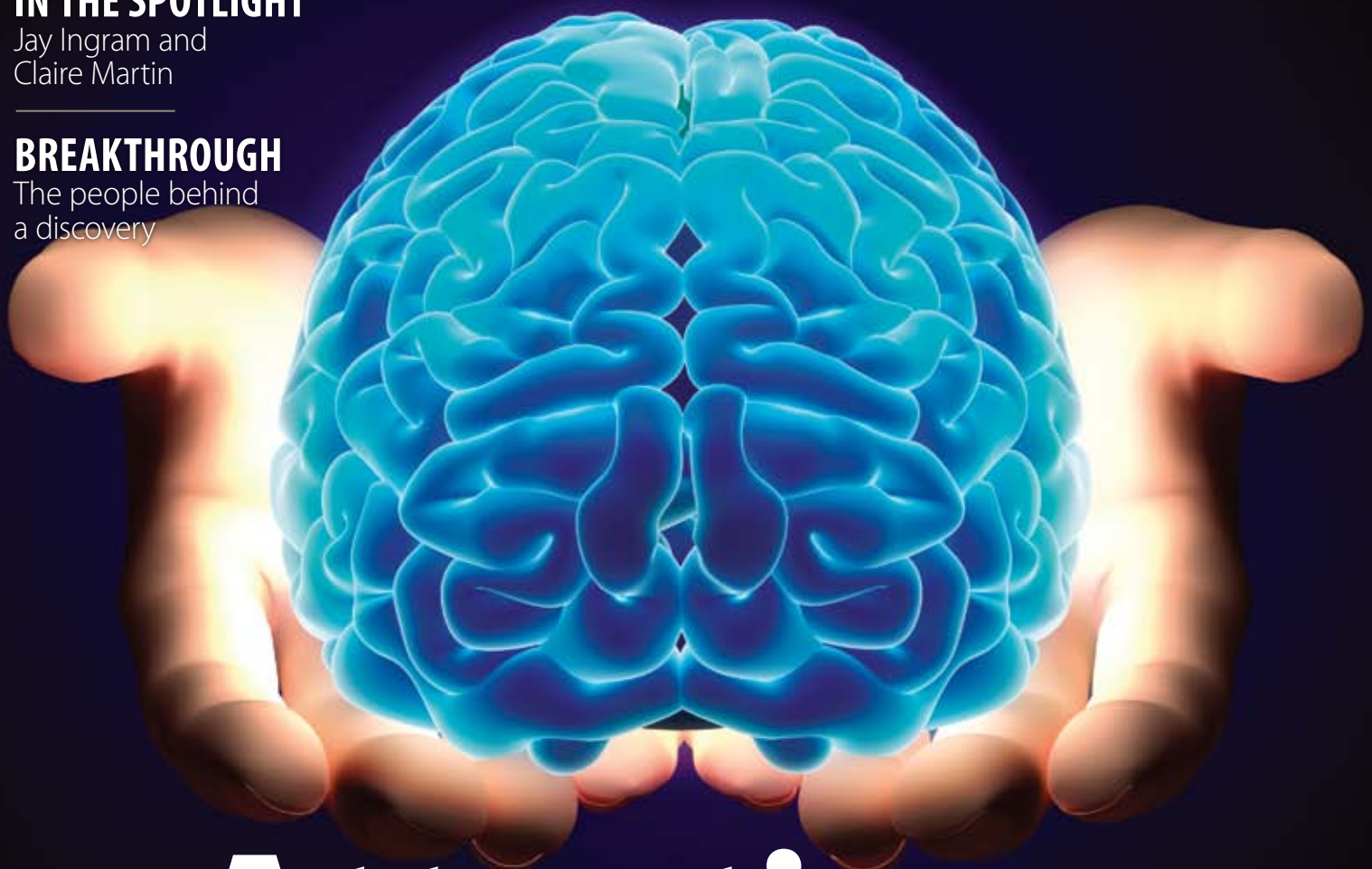

Attention please

Science psychology at work

message from the dean

This past September I watched as thousands of students made their way through the halls of the Centennial Center for Interdisciplinary Science (CCIS) on their first day of classes - their energy and enthusiasm bringing the building to life. Added to that, the excitement of Alumni Weekend, an Honorary Degree conferral and the grand opening of CCIS – it was a Fall to remember.

The opening weekend was marked by many highlights, beginning with the Alumni Awards. Claire Martin ('95 BSc) received the Distinguished Alumni Award, and Michel R. Gagné ('87 BSc) and Larry Louie ('82 BSc) received Honour Awards.

The official opening of CCIS saw a gathering of people from across government, the university community, alumni and donors, and various industries who contributed to the facility. It was a pleasure to host former Alberta premier Ed Stelmach in what was one of his last public appearances before leaving office. We were thrilled to have two distinguished alumni – Dr. Richard Taylor and Dr. Russell Schnell, both recipients of a Nobel Prize – travel to Edmonton especially to be part of the celebrations.

In addition to officially opening the building, the university bestowed an honorary degree on internationally respected scholar, Dr. Art McDonald. He has made exemplary contributions to scientific learning and discovery, and his work has propelled Canada onto the world stage of particle astrophysics through innovative collaboration at the Sudbury Neutrino Observatory, known as the SNOLAB Institute.

For the first time we hosted Discover Science, an afternoon filled with hands on activities, interactive demonstrations and engaging discussions for scientists of all ages. Our student mentors and CCIS ambassadors were out in full force, greeting and touring the hundreds of people who came through CCIS. Donors and friends of the Faculty saw the newly constructed donor wall, which celebrates and recognizes the generosity of our science community.

Through all of these events I was reminded that we stand on the shoulders of giants. Innovators who have challenged us to see further and discover more. People like John Allen, Harry Gunning, Raymond Lemieux, Max Wyman, and Dick Peter. CCIS is more than the sum of the people who have made it possible – it is the promise of things to come.

I wish you and your loved ones a safe and happy holiday season.

Gregory Taylor
Dean of Science

SCIENCE contours

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UNIVERSITY OF ALBERTA

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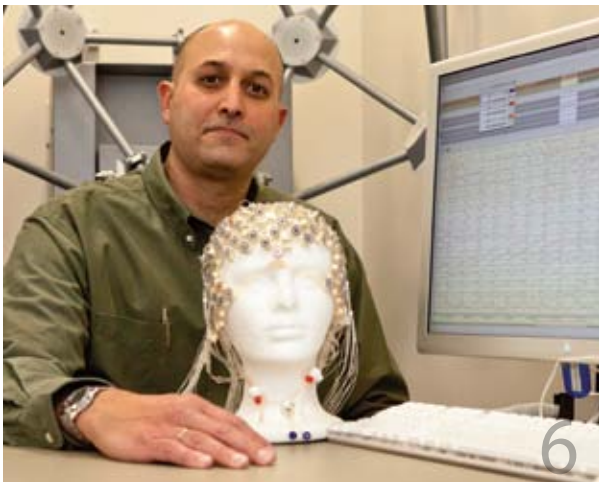


cover story

Jillian Buriak speaks to the royal couple about her work.

CHEMISTRY PROFESSOR PRESENTS ON SOLAR PANELS TO THE ROYAL COUPLE

On July 8 University of Alberta Chemistry Professor and NINT principal investigator Jillian Buriak got the chance to show off her research into low cost solar panels to the newly married Duke and Duchess of Cambridge during the final hours of their Canadian tour.

Buriak was invited to present her research about the production of more affordable solar cells. The panels being developed are as thin as paper and will be able to be rolled out of production like newspaper and have enormous application for the developing world.

"It was incredible as it was just them and I for three minutes and I was amazed at how focused the Royal couple were when I presented to them," Buriak said.

PAST CHOICES HELP FORM GAMBLING DECISIONS

Psychology researchers at the University of Alberta have found an interesting wrinkle in the decision-making process people use when gambling: People confronted with risky choices respond differently when they rely on past experiences, rather than when they just focus on the odds of winning or losing.

The research team gave people two kinds of choices. One was a choice between a sure win versus a double-or-nothing win. The other choice was between a sure loss versus a double-or-nothing loss. In some cases the odds were explained to the volunteer gamblers, and sometimes the players were just left to learn their chances through their experience playing the game.

Surprisingly, most people made the exact opposite choices when they were told the odds, opposed to when they learned about them on their own. With experience, the test subjects started to gamble on the double–or-nothing for wins and they avoided the risky choice for losses. Their gambling tendencies were reversed when they were told the odds.

"We think that people choose in fundamentally differently ways when they are remembering their past wins and losses than when they are thinking about abstract future possibilities," said U of A researcher Marcia Spetch.

"When basing choices on memory, people may focus more on the bigger wins and the bigger losses."

LET THERE BE LIFE

New University of Alberta research shows the first evidence that the first oxygen-breathing bacteria occupied and thrived on land 100 million years earlier than previously thought. The researchers show that the most primitive form of aerobic-respiring life on land came into existence 2.48 billion years ago.

The research team, led by U of A geomicrobiologist Kurt Konhauser, made their find by investigating a link between atmospheric oxygen levels and rising concentrations of chromium in the rock of ancient seabeds.

"We suggest that the jump in chromium levels was triggered by the oxidation of the mineral pyrite (fool's gold) on land," said Konhauser.

Pyrite oxidation is a simple chemical process driven by two things: bacteria and oxygen. The researchers say this proves that oxygen levels in Earth's atmosphere increased dramatically during that time.

"Our examination of the ancient seabed data shows the chromium levels increased significantly 2.48 billion years ago," said Konhauser. "This gives us a new date for the Great Oxidation Event, the time when the atmosphere first had oxygen."

The research by Konhauser and his team was published in the Oct. 20 edition of the journal Nature.

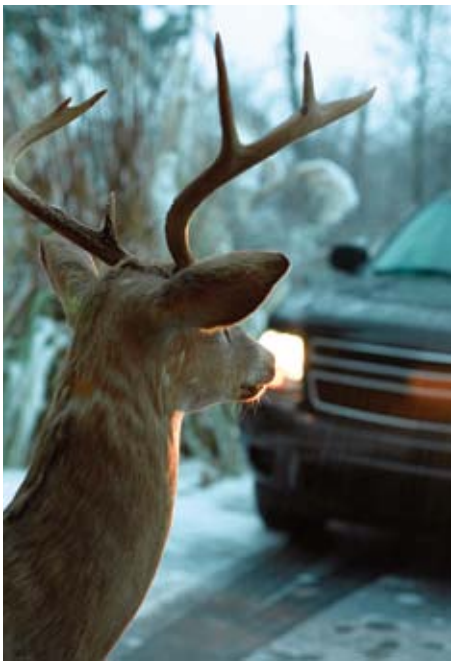
SHINING A HEADLIGHT ON DEER CROSSINGS

University of Alberta researchers have produced a map of Edmonton predicting the most likely locations where vehicles will collide with deer. The hot spots for deer vs. vehicle collisions virtually encircle Edmonton's entire city limit.

Mark Boyce, ecology professor and co-author of the paper, says the most dangerous roadways share three features: natural vegetation, bushes and trees that run right up to the roadside, roads that pass through a landscape of farm fields and forests, and high speed limit.

Now that the highest deer/vehicle collision locations around Edmonton are known, Boyce says the solutions are to cut back natural vegetation along the roads, reduce speed through the hot zones and improve the signage alerting drivers to deer crossings.

"The conflict between deer and traffic is a natural result of continued human expansion, pushing out of the cities through prime, real estate for deer," said Boyce.



The research, led by U of A PhD candidate Rob Found was published in the Journal of Environmental Management.

GRADUATE STUDENTS CAPTURE TOP SCHOLARSHIPS

The Faculty of Science scooped up over half of the NSERC Vanier Graduate Scholarships awarded to University of Alberta graduate students.

In total 11 NSERC graduate scholarships were awarded to the U of A, six going to Science scholars who have demonstrated leadership skills and a high standard of scholarly achievement in graduate studies in the natural sciences.

The Science winners are: Lauren Bortolotti, (Biological Sciences), Stephen Cochrane (Chemistry), Robert Found (Biological Sciences), Amada Kahn (Biological Sciences), Colleen Mortimer (Earth and Atmospheric Sciences), Diana Stralberg (Biological Sciences).

Ratmir Derda shows visitors through his new chemistry laboratory in CCIS.

U OF A GETS $4.9M FOR INNOVATION

University of Alberta researchers are the recipients of $4.9 million in funding—more than any other Canadian university—thanks to 18 grants from the Canada Foundation for Innovation's Leaders Opportunity Fund.

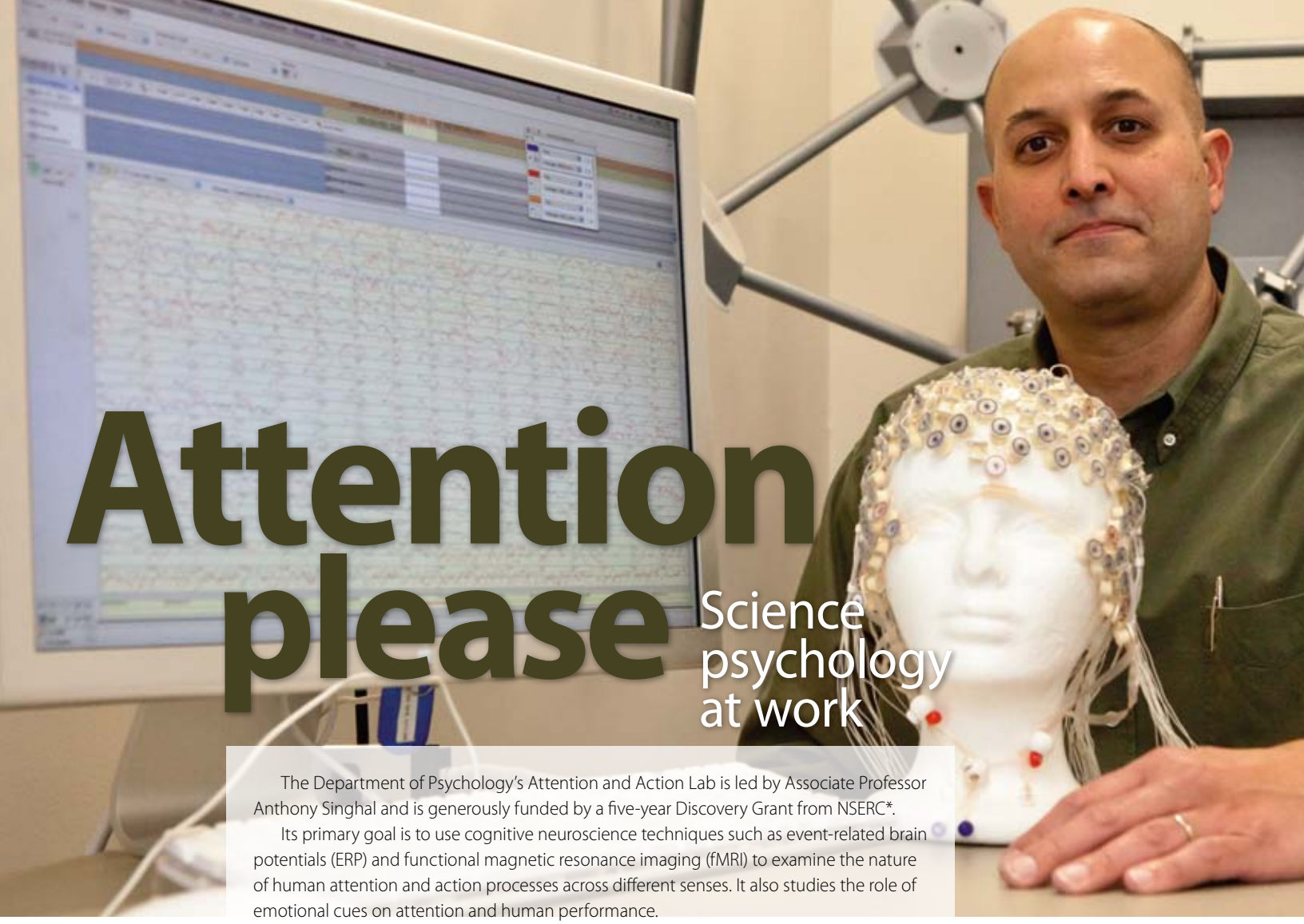
Rona Ambrose, minister of public works and government services and minister for status of women, and Tim Uppal, minister of state (democratic reform), were on campus Sept. 1 for the announcement of new funding aimed at support cutting-edge equipment and facilities at Canadian universities.

"Our government is investing in science and technology to create jobs, improve the quality of life of Canadians and strengthen the economy," said Ambrose. "This investment will make sure that our scientists have the tools they need to be successful, and help Canada develop, attract and retain the world's best researchers."

One such individual who chose the U of A was chemistry professor Ratmir Derda, who came to the university in February by way of the University of Moscow, the University of Wisconsin and Harvard. Derda received a $229,000 CFI grant for laboratory space in CCIS. The chemist and his team are developing a novel paper-based diagnostics device that does not require power. He said the device can serve as a platform for cell culture in environments with limited resources because cells grow in paper just as they do in a culture dish. Paper-based tests that use bacteriophage, viruses that attack bacteria, instead of antibodies, which can be produced on-site to diagnose diseases like malaria, HIV or tuberculosis. Paper-supported 3-D structures can also be used to create cell-based diagnostic in cancer.

Derda says having his own lab and a team of grad students was one of the big reasons he chose the U of A, as was access to such a large medical school and cancer centre, but was pleasantly surprised by the level of co-operation going on at the U of A.

"The campus is created in such a way that there are so many centres of excellence open to collaboration," said Derda. "I have been in all sorts of institutions and it is often difficult to build these connections because they don't have the culture of collaborative work.



Attention please

Science psychology at work

The Department of Psychology's Attention and Action Lab is led by Associate Professor Anthony Singhal and is generously funded by a five-year Discovery Grant from NSERC*.

Its primary goal is to use cognitive neuroscience techniques such as event-related brain potentials (ERP) and functional magnetic resonance imaging (fMRI) to examine the nature of human attention and action processes across different senses. It also studies the role of emotional cues on attention and human performance.

The following articles explore some of the work being done by this research group.

Natural Sciences and Engineering Research Council of Canada

ATTENTION AND ACTION

Science hasn't even begun to cross the threshold when it comes to understanding the human brain. But U of A neuroscientist Anthony Singhal is excited to be among those tentatively knocking at the door.

Singhal leads the Attention and Action lab, where a team of scientists has been using the best current technologies—such as ERP (event-related potentials, or "brain waves") and fMRI ("brain scans")—to examine how our brains deal with competing stimuli processed by the attention, action, memory, and emotion systems.

"On an everyday basis, our brains integrate all kinds of information," says Singhal. "We know that some of the integration happens in specific parts of the brain, but we don't know much about the mechanisms of that integration. That's really the basis of my work for the past number of years."

Traditionally, emotion and cognition have been thought to be at opposite ends of the spectrum—think Kirk versus Spock. "We now know that there's some reciprocity between the parts of the brain that control our cognition and the parts that control our emotions," Singhal observes.

As a grad student at York University, Singhal looked at the basic effects of distractions, using a flight simulator. Expert pilots adjusted nimbly to complicated scenarios and multiple distractions, whereas novice pilots were thrown off much more easily. "Just little beeps here and there could cause them to miss the runway, or crash," says Singhal. "We found some clear markers in the brain associated with those deficits in their performance."

While still working toward his doctorate, Singhal was the lead project-scientist of a study involving astronauts on the International Space Station—to measure their multitasking skills, and to see how well they could adapt over time to the effects of working in microgravity. "I got to travel down to NASA in Houston, quite a bit, to the Johnson Space Centre," he says. "That was a very cool project for a PhD student."

Traditionally, emotion and cognition have been thought to be at opposite ends of the spectrum—think Kirk versus Spock.

Anthony Singhal

ATTENTION AND EMOTION

In the basement of the Mazankowski Institute, twelve-year-old "Darren" has found an unusual way to get out of school for the afternoon. He's lying in an fMRI machine viewing a series of images while neuroscientists record his brain activity.

As a healthy control subject, he's also helping provide a set of baseline data for a U of A study into the potential of mindfulness-based stress reduction (MBSR) to treat mood disorders in troubled adolescents.

In the fMRI control room, neuroscientist Andrea Shafer explains some of the basics of MBSR. "If an individual can be more mindful of how they feel in the moment, that may help them handle that moment, especially if it's stressful or emotional," she says.

Pediatrics professor Sunita Vohra, who leads the MBSR project, says it will fill a significant research gap. "There's lovely adult data that suggest that MBSR may be quite helpful with a variety of conditions—anxiety, depression, stress, or coping. But we really don't have a lot of pediatric data right now."

Three U of A teams are working together to generate that data. Vohra's team is focusing on the quantitative side—comparing the behaviour of children in a regular program against those who also receive training in MBSR. "These children are already receiving the best of what our health-care system has to offer in terms of drug therapy, non-drug therapy, etc.," Vohra says. "We're adding an adjunct, MBSR, to see if it can help with their coping and resilience, to help decrease anxiety, and to promote feelings of self-capacity."

A second team, led by Jessica Van Vliet, is looking at the qualitative aspects of the treatment—not just if MBSR works, but why and how it works.

The third team is the neuroscientists—Shafer, along with Anthony Singhal and Florin Dolcos. "It's a wonderful opportunity," says Vohra, "to not only look at MBSR's effects through surveys and other measures, but to actually see the way people's brains light up in an fMRI."

In the end, Darren's somewhat tedious afternoon might help improve countless lives. "We're starting with a high-risk group that we think could benefit the most from MBSR," says Vohra, "but the overall population that could benefit is enormous. All children face stress in their lives—all people face stress in their lives. So how can we help them cope better?"

These days, the research in Singhal's lab is a bit more down-to-earth. One project looks at the potential for troubled teens to use cognitive strategies to help alleviate their emotional problems—a technique called mindfulness-based stress reduction (MBSR). Another examines the neural markers associated with the distractions we encounter while driving—a project we could all learn from. "I never use my phone anymore when I drive," Singhal laughs.

Although his field is still in its infancy, even with all of our current advances, Singhal is thrilled to be paving the way for future neuroscientists. "We're at the level of understanding the human brain that they were 150 years ago in terms of understanding how the heart works.

HANG UP AND DRIVE

Michelle Chan

Scientists sometimes struggle to explain the real-world implications of their research. This is not a problem if your subject is distracted driving.

"We're talking about millions and millions of dollars in health care costs, and lost wages, and lawsuits, the substantial social cost," says Anthony Singhal, leader of the U of A's Attention and Action Lab. "The relationship between distraction and injury and death in automobiles is pretty high. It's not as high as alcohol, but it's still pretty high."

Although one particular form of distraction—cell phone use—tends to dominate the discussion these days, Singhal and his team are looking to measure the effects of a distraction at a more basic level, he says. "For example, one of my students, Michelle Chan, is doing a study to look at emotional information on billboards."

In Chan's experiment, people navigate a course on a driving simulator while passing billboards portraying single, emotionally laden words. Surprisingly, even such a simple stimulus can measurably affect people's driving performance, says Chan. "People actually drive faster when they're feeling positive emotional stimuli. For example, words like happy and love. And they drive more slowly when they see negative words, like reject, abuse, hate, crime, etc."

Singhal's researchers also study the underlying neurological mechanisms behind the distractions' outward effects (speeding and slowing down). "We worked out a scenario where they can actually do the simulation in the MRI, so we'll be able to see exactly where in the brain things are happening," says Singhal. "Ultimately, I'd like to get to the point where we can get an ambulatory brain-wave system. It would be nice to be able to put people in a car on a closed course, and monitor brain waves as they're driving."

Distracted driving laws are just one step in making the roads safer, says Singhal. "The research we're doing will be important to inform policy around things like roadway design, and even cockpit design for automobiles."

Quilts as mathematical objects

Gerda de Vries and student

Gerda de Vries with some of her creations

By day, Gerda de Vries is a biological mathematician, using her skill for mathematical modeling to collaborate with biologists to better understand various physiological processes at the cellular level. Not one to leave work behind, de Vries brings it home and pours math into her quilting.

De Vries, an applied mathematics researcher in the Department of Mathematical and Statistical Sciences, has developed a name for herself in the quilting world, thanks in part to the "Quilts as Mathematical Objects" lecture that she presents on campus every so often. She came by quilting quite honestly, having grown up in a Dutch household where the women knitted or sewed constantly.

"When I was six years old, I learned how to knit from my grandmother," said de Vries. "There are pictures of me standing behind a sewing machine when I was three years old, because that's what my mom was doing, so sewing was a natural thing to do."

In 1996, while working as a post-doctoral fellow in applied mathematics in Maryland, de Vries attended a quilting workshop in Washington, D.C. For her first quilt, de Vries said she just went with the flow. For her encore quilt, she was already pulling patterns out of a math book.

"I used tessellations, which is how shapes fit together without any overlap and without gaps. Think mosaics and floor tiles," said de Vries, adding her third quilt was her own design. "One of the things mathematicians like to do is create rules and then, within the boundary of the rules, find out what all the possibilities are.

"I didn't set out to make mathematical quilts deliberately; it's something that just came about because that's the way I think. When I came to Edmonton in 1998 and joined the quilters' guild, I began displaying my quilts at exhibitions and people would recognize the signature of my quilts and say, 'Oh, that's one of Gerda's quilts.'"

> "I used tessellations, which is how shapes fit together without any overlap and without gaps. Think mosaics and floor tiles."

A typical "Gerda quilt" might include the use of fractals—geometric objects that appear similar at all scales of magnification and that can be used to describe coastlines, trees or even lung structure. The wonder in this pattern for mathematicians is, in theory, that this process can be repeated infinitely. But in quilting, de Vries said, it goes only as far as the nimblest fingers can sew.

"A lot of math is involved in quilting, even in quilts that aren't made intentionally as mathematical quilts," said de Vries. "When I think of traditional quilts, I think of quilts where you have a block repeated over and over again, creating pattern. As soon as you are talking about patterns, you're talking about mathematics.

"It's amazing just how many people think mathematically without realizing it."

Shifting ground

Dr. Garry Clarke's career in glaciology began at the U of A, as an undergraduate, and has lead him to coldest reaches of the Arctic

Garry Clarke

Like both of his parents, and two grandparents, Dr. Garry Clarke ('63 BScHons) registered at the University of Alberta after high school. He had his sights set on architecture school and needed a bachelor's degree of some kind before he could apply.

But after taking a few geology and physics courses, he was smitten. The study of glaciers was particularly fascinating and he began reading research on the subject, just for fun. "I'd read a journal cover-to-cover, like you'd read things as a kid," he says.

In his third year, Clarke was invited on a two-month field expedition to a new research station in the Yukon, close to several major glaciers. While he couldn't yet do his own research, he happily assisted the scientists and soaked up the northern ambience. "It was just glorious. The Yukon's fabulous, the landscape's beautiful and people are crazy, in a wonderful way," he says.

It was an exciting time to be studying glaciology, since the field was still new. Victorian scientists had latched onto the subject of glaciers in the 1840s (they tried in vain to find the thickness of glaciers and argued about how they flowed), but moved on to new questions. After the war, glacier science was picked up again and the British Glaciological Society came into being. By the 1960s, glaciology journals were popping up and the study of slow-moving ice began evolving rapidly.

Clarke followed an influential U of A prof, Dr. George Garland, to the University of Toronto where he completed his master's and doctoral degrees. In 1967, he became a faculty member at the University of British Columbia, where he's remained ever since. Now, he's a professor emeritus and continues to conduct research on the physics of glaciers and ice sheets (masses of ice larger than glaciers).

For decades, much of his work has centred on the Trapridge Glacier, in the Yukon, where he and colleagues have planted a range of measurement tools (many invented for their research purposes) underneath and within the glacier.

Over the decades, Clarke has been saddened to see climate change damage northern ecology in irreparable ways, but he's motivated by the possibility of influencing political and cultural change and propelled by a lifelong passion for geophysics. "People wonder why I'm not spending more time golfing," he laughs, "but I'm enjoying myself."

geoLOGIC
A well-th of data

Ben Rostron, a professor in the Department of Earth and Atmospheric Science (EAS) leans over a student in the computer lab as she uses a software package called geoSCOUT, donated to the U of A by Calgary's geoLOGIC Systems. With a few mouse clicks, she pulls up a map of a specific area in Alberta, a grid riddled with black dots. She clicks on a dot, and the screen instantly fills with a wealth of data collected from a single oil well.

Rostron and his students have used geoSCOUT for years, but he still marvels at its power. "I can click on any one of those thousands of dots, and call up all the information on every well drilled in Alberta since about 1946," he says.

"That includes information on the production of the well—all the oil, all the gas, all the water, the rates, the time it was in production. The injection—how much water was injected into that well? How long was the well operating for? They look at things like porosity, permeability, density. You can call up that information. You can call up land information—who owns the land nearby. Pipeline information. Pool information. Just about anything."

Oil and gas companies collect data for every well they drill, and turn it all over to the government. In effect, it's all public information, available for anyone to peruse. But that doesn't exactly make it accessible or useful, says Rostron.

"Back in the day when I did my thesis research, we spent years typing data into spreadsheets and checking paper files and data dumps." He shakes his head at the memory.

The genius of geoLOGIC lies in taming that torrent of public data, says Rostron. "Now you can just go into geoSCOUT, select the area, the formation—and, click, click, click, it spits out a data file that you can import into Excel."

Of course, that kind of power comes at significant cost to oil and gas companies, who rely on programs like geoSCOUT to guide their exploration and development. But since 2001, the company has donated nearly $40 million worth of software and data management to universities in North America and Europe, says geoLOGIC President David Hood. "Improving the abilities of the geoscientists of the future is vitally important and we are proud that our solutions have become the tools of choice for new graduates."

geoSCOUT is certainly the tool of choice for Rostron's grad students. "My students couldn't do their thesis research without this software, bottom line."

Graduate student Tibor Lengyel uses some of the geoLOGIC software for his project work.

Mike Jenkins checks one of the traps near the U of A campus.

Buggy by nature

Tramping through the snowy woods, Mike Jenkins ('93 BSc) looks every bit the stereotypical forester—long hair, bushy beard, ruddy complexion. But Jenkins's forest is an urban one. Today, he's collecting an insect trap from a stand of poplars a few steps away from the Biological Sciences building.

Jenkins, who heads the City of Edmonton's pest management lab, doesn't do much fieldwork in the winter. "Normally we run this trapping program until about the end of September," he explains. "But because the banded elm bark beetle has a longer flight time, we've kept these traps up a bit longer, which is why I'm now having to take them down in the snow."

Jenkins pauses to cut the trap free, using a highly specialized piece of equipment—an X-Acto knife duct-taped to a broom handle. He takes the trap—a large glue-coated cardboard grid baited with scents and pheromones—and folds it gingerly. "I've had my hair stuck to these a few times," he laughs.

Like many Science grads, Mike followed one path for his studies before veering off onto another for his career. "When I was doing my BSc, I was more interested in Pleistocene megafauna—things like wooly mammoths and sabre-tooth tigers," he explains. "In one of the invertebrate zoology classes, I remember saying to a friend, 'Why do I have to do all this stuff on invertebrate anatomy? I don't want to do anything with invertebrates.' And, of course, I ended up working mainly with insects."

> "When we found the very first banded elm bark beetle, we said, 'Hey, I finally found one!' And at the same time, it was, "Oh, no—I found one.'"

During a summer job at the Wagner Natural Area, Jenkins discovered a special qualification for his future career: mosquitoes simply don't seem keen on his particular brand of blood. As he continued with an after-degree in Education, he found himself drifting more and more towards entomology.

In his first job with the city, Jenkins worked on an inventory of elm trees, as part of a protection strategy against Dutch Elm Disease. To this day, he maintains a special interest in elm pathogens—not just the European elm bark beetle, the more famous threat, but also the banded elm bark beetle, which can spread the disease and can also kill trees outright.

The battle requires countless tedious hours over a microscope. "When we found the very first banded elm bark beetle, we said, 'Hey, I finally found one!' And at the same time, it was, "Oh, no—I found one.'"

These days, Jenkins is most visible as the spokesman for Edmonton's mosquito control program—a public obsession every summer. He helps plan and guide the city's efforts, and bravely faces the media whenever Mother Nature gets the upper hand.

His role also requires him to spend most of his time chained to his computer and phone. But, today at least, he seems happy to be outside.

Breakthrough

The people behind a discovery

U OF A CHEMISTRY TEAM PRODUCES A "GAME CHANGING" CATALYST

In early 2011, University of Alberta Chemistry Professor Steven Bergens and his graduate student Jeremy John discovered a remarkably active catalyst that has the potential to revolutionize the chemical industry.

Their results were published in a high-ranking international chemistry journal and the discovery has the potential to improve the economics, efficiency and environmental philosophy of many multi-billion dollar industries including agrochemicals, pharmaceuticals, and flavorings.

Researchers around the world have been working tirelessly for more than 50 years to find a catalytic system for this vital class of reaction that operates efficiently and produces little to no waste. In February 2011, Bergens's student Jeremy John, an international student from Trinidad and Tobago, discovered such a catalyst while working in his laboratories.

"People have been seeking an answer to this problem for decades… and now we've changed the game," said Bergens.

"We are hugely excited, and the challenge now is to optimize the system and improve our general understanding, so that we can apply what we learn to make more important discoveries," said Bergens.

Steve Bergens and Jeremy John

Steve Bergens

Q: When did you come to the U of A?
A: I arrived in July, 1993 when I began as an Assistant Professor.

Q: How long have you been working on the catalyst research?
A: I've been working in the area of catalysis since late 1985, when I began my graduate studies at the U of T.

Q: What do you remember about your own experiences as a graduate student?
A: I carried out my graduate studies at the Universities of Toronto (MSc) and Chicago (PhD). I remember discovering new chemistry, the hard work, the low income, the cheap food, lots of good friends that supported each other and to drink with, and huge long distance bills.

Q: When did you take on your first graduate student?
A: 1993, the year I arrived at the U of A. We both were excited and worked hard to get everything going. Day one involved donning rubber gloves, grabbing the Ajax, and scrubbing counters in an empty lab. It was a starting from scratch, working together experience. He did not know how to be a graduate student, and I did not know how to be a professor, so we worked together, overlooked each other's mistakes, and sorted it out.

Q: When did you first have contact with Jeremy and tell me in a paragraph how he came to work in your lab?
A: My graduate lab in Chicago had a visiting professor working in it from Trinidad and Tobago. He contacted me a year before Jeremy showed up, and recommended him and another student, Sonja Francis, to me as potential graduate students. After email correspondence, they both joined my group. I've been delighted with their progress. They are both very hard working and dedicated.

Q: How important are graduate students to the success of your project?
A: Graduate Students are everything to a project. I would say that the students' contributions are to become experts in their projects, to eventually know more about their projects than I do, to dissect all aspects of the project, and to come up with ideas that make the projects work and to make them as important as possible. There's no such thing as a bad idea, but there's almost always a better one. Students drive themselves and me to come up with the best ideas we can over the course of the research.

Q: Describe the day of the breakthrough in the catalyst research.
A: Jeremy stepped into my office with the spectrum that showed the reaction worked well and said "you need to look at this." We immediately started planning control experiments and we discussed the results daily (at all hours) from that point on to develop the project as soon as possible.

Jeremy John

Q: When did you come to the U of A ?
A: I came in the Fall of 2008 as a new international student from Trinidad and Tobago.

Q: What made you choose this university?
A: The U of A has an excellent chemistry department. It is equipped with extremely knowledgeable and helpful faculty and support staff and world-class facilities to support research.

Q: How did you come to be in Dr. Bergens Lab?
A: I initially short listed Dr. Bergens as a potential research supervisor. I was surprised when he later contacted me via email and learned that he shared a friendship with one of my closest and most respected lecturers at my old university, Dr. Lincoln Hall. After consulting him, he gave Dr. Bergens the highest recommendation and on his recommendation the rest is history.

Q: Describe a typical day in the life of a graduate student.
A: Like most graduate students my day comprises of:

- Carrying out research pertinent to my project: i.e. setting up new reactions, working up old ones.
- Reading literature: relevant to my field or for general knowledge
- Carrying out my assigned teaching duties such as marking labs or teaching undergraduate laboratories
- Attending scheduled meetings: i.e. TA meetings or meetings with my supervisor to talk about the results of my recent work.

Q: What do you think are the most important characteristics to have as a graduate student?
A: Patience, tenacity, natural curiosity, enthusiasm and good organizational skills.

Q: Describe the day of the catalyst research breakthrough.
A: The day started with me taking down my reaction. I then went down to the Nuclear Magnetic Resonance room to analyze the result of my reaction. I found that in a simple ^{1}H NMR experiment, the reaction had worked. I ran many other different NMR experiments to ensure that the product I thought I had supported the result. When the result was verified, I raced to Prof. Bergens's office to share the news. We were ecstatic and we began discussing what control reaction and other substrate molecules we needed to do in order to get this result out the door as soon as possible. The rest of the day was devoted to planning my experiments accordingly.

Q: What do you hope to be doing in 10 years time?
A: I would like to be working on cutting edge catalysis research either in academia or industry.

IN THE SPOTLIGHT

Jay Ingram and

Jay Ingram

Jay Ingram ('67 BSc, 08 DSc Honorary) and Claire Martin ('95 BSc) are U of A Science graduates familiar to most Canadians for their work in the media. Both recently visited campus – Claire Martin being presented with a Distinguished Alumni Award in September and Jay Ingram hosting the Manning Awards in October.

Science Contours caught up with them both for a short Q and A.

What was your favourite science course at the U of A?

CM: EAS 270, The Atmosphere with Dr. Lozowski was great and EAS 458 Cold Regions Geoscience with (I think) Dr. England was a fabulous course too.

JI: Virology and scientific Russian. The Russian came in handy for the games from Moscow in the '72 hockey series because names on the screen were in the Cyrillic alphabet, and only I - of my friends at least - could read them.

What in particular made it stand out?

CM: EAS 270 was the "grand broad-view" course for me. It brought context to the entire program.

JI: Virology made the molecular biology of reproduction crystal clear - loved that, and love it still.

Who were some of the standout professors at the U of A who had an impact on you?

CM: Dr. Lozowski was the stand-out professor for me. He was, and still is, a calm voice in a sea of sometimes frantic learning. He encouraged me to think outside the box.

JI: Don Westlake and Tats Yamamoto in microbiology. But to be truthful, I already loved biology by the time I got to university.

What prompted you to become a science communicator?

CM: Quite honestly I got a little tired with the usual portrait of a scientist as being characterized as a lab coated, socially awkward dweeb, unable to converse in the "real world." I decided I could probably do a better job and maybe even raise the profile of the hard-working meteorologists out there.

JI: I have no idea. I do know that long before I abandoned academia I had already decided (but somehow not fully realized) that this was what I wanted to do.

Describe your first on-camera moment as a public broadcaster.

CM: I was first put on-air by Global (then ITV) Edmonton in the late 1990's when the station expanded its news programming to start earlier in the afternoon at 5:00 p.m. I then tag-teamed with a much-beloved weather presenter, Bill Matheson for several years before he retired and I took over the "flagship" 6:00 p.m. newscast. I have to say that ITV took a great risk with hiring me in those early days. I was quite literally awful on-air - I barely breathed once - seriously - just one single huge breath for the entire 2 minute weathercast!

JI: During my first guest appearance on a TV talk show, my brain completely froze, and if the host hadn't prompted me, I'd be sitting there still.

Claire Martin

Is there a particular story that stands out?

CM: There are so many stories - it's hard to pick out just one. I do however remember one event - the Pine Lake Tornado night - in July 2000. Obviously the newsroom was thrown into chaos following the tornado; hardened, experienced reporters fought back tears when they arrived on scene. It was horrific. It reminds me to this day, to never be flippant with weather warnings.

JI: I think experiences in places stand out more than stories: for me, being in Jane Goodall's Gombe, at the Wolong panda reserve in China, and in Kazakhstan for the launch of the first piece of the International Space Station.

If you had two pieces of advice for someone interested in a career as a science communicator what would they be?

CM: Be honest. Be real.

JI: Don't do it if you're not passionate, both about science and going public with it. And two, if you're telling yourself that you want to do science on, say, TV, you're fooling yourself. If you love science you'll do it anywhere. If you have targeted TV, that's because you want to be on TV.

What are the challenges for science communicators in the rapidly changing world of social media/online communication?

CM: Oh that's tough. I - personally - am hopeless with new media! I am simply too busy to take part in Facebook and Twitter etc. But for the next generation of communicators it will be imperative to stay "in touch" on line.

JI: The challenge today is to make a career out of a world where everything (blogs, Twitter, Facebook etc.) is unpaid.

You have recently had an opportunity to visit campus and see the new Centennial Centre for Interdisciplinary Science. What were your impressions?

CM: That, and the overall ambience on campus, made me want to come back to university.

JI: There's more daylight in the CCIS than I experienced in four years of microbiology.

What makes you proud to be a University of Alberta Science graduate?

CM: Funnily enough, the university, in the eyes of other U of A and non U of A graduates, is held in such high esteem, that it makes you look back at your time, your experience and the school with a greater degree of pride. I think I am more proud now than when I stood on stage and actually got my degree. I loved my time at the U of A - in the words of Robert Service - Have you suffered, starved and triumphed, groveled down, yet grasped at glory, grown bigger in the bigness of the whole? - that's how my time at the University felt. I grew *big* there.

JI: It was the interdisciplinary nature of the place that allowed me and my friends to pull one of the great university pranks OF ALL TIME. It involved engineers (the target), dairy science (the materials) and science (the collaborators). Where else could you do that?

Claire Martin

Frank Weichman

Branching out

Professor Emeritus Frank Weichman enjoys some of the trappings of retirement—his office hours include plenty of space for coffee breaks and lunches with colleagues. But he also finds time for a wide variety of side projects, from classroom outreach, to work with street kids, to sharing sustainable technologies with Africa.

Shortly after retiring in the mid-90s, Weichman began sharing his passion for physics with local schoolchildren. "The homework problems in the back of textbooks are pretty atrocious," he says. "It's been my self-imposed task to make up some interesting, simple physics problem that the kids can relate to in their daily lives."

To this day, Weichman goes out to schools on a regular basis, toting boxes of physics demos, to "entertain the kids with a bit of science for an hour or so," as he puts it. A local publisher collected Weichman's problems for a book, and Brian Martin, a professor at King's University College, plans to rework some of them for an on-line physics course.

Weichman has also enjoyed a long and continued involvement with iHuman, an acclaimed Edmonton program for street kids. This particular side project began as an accident of geography—"I happen to live across the street from Wallis Kendal, the driving force behind iHuman. He found out I could add numbers together, and I ended up becoming treasurer. I'm not treasurer anymore, but I still keep an eye on the funding and help wherever I can."

And where does Africa fit in? Years ago, Weichman tinkered with the idea of an efficient wood-burning stove for backpackers. His eventual stainless-steel prototype worked beautifully, but was expensive to produce, and never caught on. "Most people just want the convenience of their gas stoves," he observes.

He set the idea on the back burner, so to speak, but it re-emerged after he retired. "It occurred to me that, well heck, it should be possible to make a similar stove out of pottery." He enlisted the help of local potter Lorris Williams, who produced a ceramic stove that proved just as efficient as the fancier steel model.

Later, when a local student group came to Williams for help in designing a ceramic water filter for use in Africa, he told them about Weichman's stove. The stove, now christened "CeraJiko," is now being produced by potters in Africa, along with the water filters, as part of the Kenya Ceramics Project.

Retirement may provide a hard-earned opportunity to slow down, but, as Frank Weichman proves, it can also be a time of branching out.

> "It occurred to me that, well heck, it should be possible to make a similar stove out of pottery."

New **math centre** helps students bridge the gap

The Decima Robinson Support Centre helps undergraduates get a handle on 100- and 200- level math and stats classes. The room was named after the first graduate of the University of Alberta – a mathematics graduate Decima Robinson who received her degree in 1911.

Twice a week, Alyssa Barker and a friend head to the fifth floor of the Central Academic Building (CAB), to get homework help at the new Decima Robinson Support Centre for Mathematical and Statistical Sciences. While Barker is a second-year math and finance student with an aptitude for numbers, she still bumps up against tricky homework questions and would rather seek help than struggle on her own. "It's definitely been good for my stress levels," she says.

It's also a much better option, financially, than paying a tutor. "I believe that the center is an excellent resource that the University offers," she adds. "Anytime somebody asks me about homework, I tell them how great the math help room is."

Since September, students like Barker have been flocking to the new facility, which was created where the old math library was once housed. It's a large space, with two large rooms for drop-in students, and a room for pre-calculus courses. White boards plaster the wall, providing a convenient work area for students and TAs. Between the hours of 9 am and 3 pm, students and TAs unravel math concepts together.

The centre is meant for students in 100- and 200- level courses, who may have found themselves ill-prepared for university math. "The transition from high school to university is huge," explains Dr. Gerda de Vries, associate chair, undergraduate studies, of the Department of Mathematical and Statistical Sciences. However, many students must take math and statistics as a prerequisite for their program of choice, and need to master the material.

While the department did have a help centre before this, it was located in the Education Building and didn't meet the needs of many students, says centre coordinator, Sean Graves. But this new facility has resonated with students in a big way. Just weeks after opening in September 2011, students flooded the centre, even as a construction crew was still installing ceiling tiles and blinds.

On average, about 500 students visit the centre each week and about 30 TAs are on-hand to answer questions. On Thursday and Friday afternoons, there's often standing room only. "It's incredible," says Graves. "All day long, there's a flow of students. It's never empty. It's great to see students take advantage of this resource."

Sean Graves

CCIS Grand opening

The future of Science awaits

On September 23, 2011 former Alberta premier Ed Stelmach officially opened the Centennial Centre for Interdisciplinary Science (CCIS) at the University of Alberta.

Over 400 people turned out to celebrate the occasion, which also included the conferral of an Honorary Doctorate of Science on Dr. Art McDonald, director of the Sudbury Neutrino Laboratory.

In her remarks, University of Alberta President Indira Samarasekera said the completion of CCIS was the realization of a dream the university had to revolutionize the way it delivers science education and conducts science research.

"We were thinking about the education that students of the next century would need. We were looking at where the next great scientific discoveries would come and our aim was to take science education and research to a new level in Alberta—to build scientific infrastructure that rivals the best in the world.

"Today that vision is now reality," she said. The celebrations were timed to coincide with Alumni Weekend allowing hundreds of people to tour CCIS and fully appreciate the opportunities this new facility offers students, researchers and the community.

Honorary Degree recipient Dr. Art McDonald gives his address to those attending the official opening.

Invited dignitaries listen as Dean Gregory Taylor speaks about the significance and impact of CCIS.

CCIS is open for business, its soaring southern atrium now echoes to the sound of thousands of students during class change and is home to hundreds of researchers and staff.

Science graduates Dr. Russell Schnell and Dr. Richard Taylor (both winners of a Nobel Prize) came specially to celebrate the official opening of CCIS.

Guests mingle in the south atrium.

Former Alberta premier Ed Stelmach, Dean Gregory Taylor and U of A President Indira Samarasekera.

History in the making

In an era of urbanization, Jean Crozier ('84 BSc) finds it sad that so few Edmontonians have held a warm egg in the palm of their hand. She cherishes memories of summer spent at her grandparents' farm near Irma, AB, collecting eggs, pumping water, and cutting wood. "I feel really lucky to have had those kinds of experiences," she says.

She also remembers the train she took to get there – literally a milk-run, that stopped at the Viking Creamery – that chugged slowly across the prairie terrain.

Nowadays, Crozier is a semi-retired writer – and author of a family memoir called *No Corner Boys Here* – after raising five children and running an information management business for two decades. Like the train she took to the farm each summer, Crozier's life has taken plenty of interesting twists and turns before arriving at her destination.

After attending public school in Edmonton, Crozier married and started a family, moving out to Namao when her five children were school-aged. She liked rural life, but without a telephone or reliable vehicle for the first few months, Crozier felt isolated. When she discovered the school was seeking a part-time library clerk, she jumped at the chance. Although she'd never considered that kind of work, it was an immediate fit.

In 1972, she registered in a library technology program at Grant MacEwan Community College (now MacEwan University) and after she graduated, began working in the libraries of local engineering companies. Crozier liked it, but within a few years, she was itching to go back to school. So, she registered at the U of A and began taking physical geography courses (a program her company offered to fund) at night or on weekends.

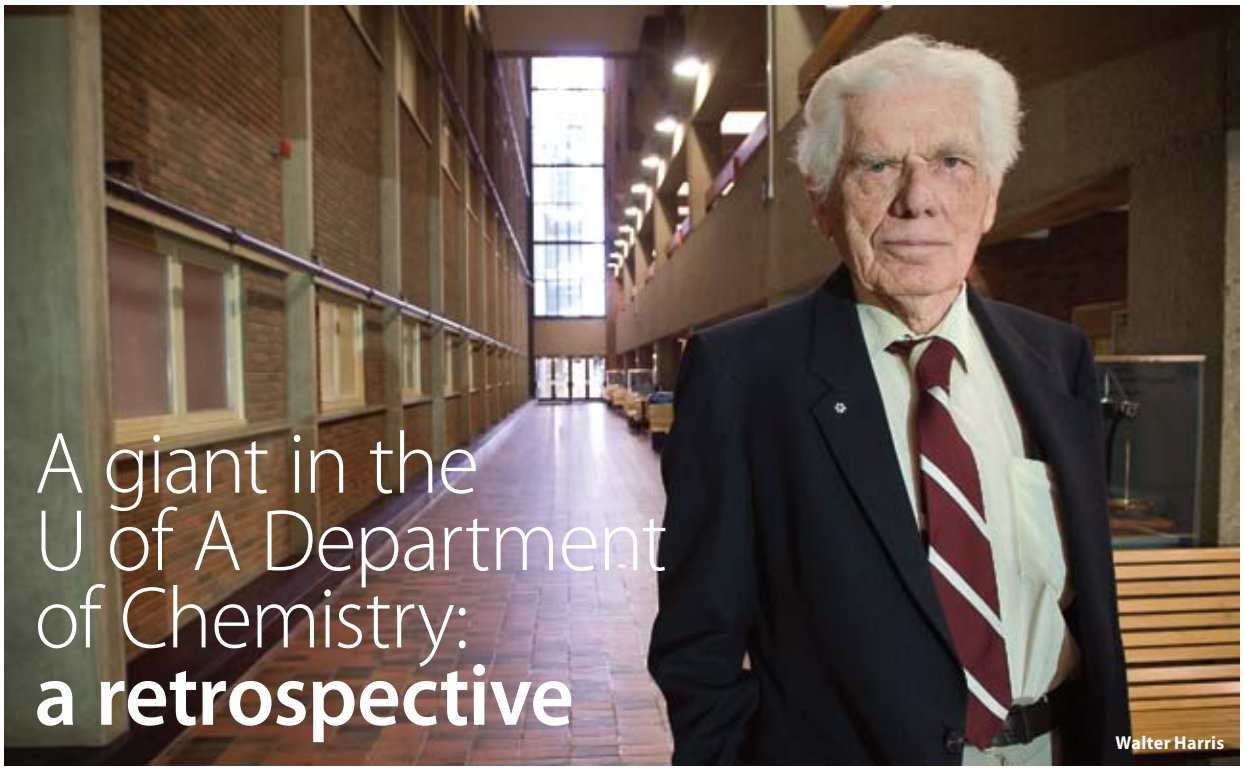
It was a huge load, managing part-time studies with a full-time load and a family, but nine years later, Crozier had her degree. Since most librarians have arts backgrounds, a degree in science helped her stand out from the pack. In 1981, she decided to start her own information management company and set up both library and records management systems for engineering and other companies.

At the time, business was not friendly to women – especially divorced mothers. "Business is only occasionally done in the boardroom," she notes. As a busy single parent, she hardly had time to go golfing or out to dinner with a prospective client, even it had been considered appropriate (it wasn't). But Crozier ignored the barriers and soldiered on: "You do what you have to do to keep bread on the table."

> "Business is only occasionally done in the boardroom."

After 20 years, Crozier decided to close the company and retire – but she hasn't slowed down. These days, she writes and teaches. She's also been instrumental in the Alberta Women's Memory Project which is recording and preserving the stories of women all over the province. "There are so many marvellous stories," she says.

Jean Crozier



A giant in the U of A Department of Chemistry: **a retrospective**

Walter Harris

In October 2011 the U of A community mourned the passing of a homegrown talent, one of the great researchers to work in the chemistry department. Walter Harris ('38 BSc, '39 MSc, '91 DSc Honorary), the prairie farm kid who almost single-handedly inspired the next generation of the world's analytical chemists, died Oct. 20. He was 96.

Born June 9, 1915, Harris grew up on a farm near Wetaskiwin, which helped develop his curiosity about the way things work. After graduating from high school, he left for the U of A where he uncovered a passion for chemistry. He received his Bachelor of Science degree from the U of A in 1938 and his master's degree in 1939 for studies of the distribution of selenium. He left the U of A for the University of Minnesota to study under Piet Kolthoff—the father of analytical chemistry in North America—where he completed a PhD in 1944.

When Harris returned to the U of A in 1946 to take a teaching position, the chemistry department had six academic staff teaching chemistry to more than 2,000 students; there were no teaching assistants and no analytical chemistry divisions.

In 1957, Harris took a leave of absence to do research in gas chromatography at the Chalk River Nuclear Laboratories. During that time, analytical chemistry had begun to fall out of favour at cash-strapped universities. Despite post-war industry developing an ever-greater need for analytical chemists, universities across North America—including the University of Toronto and Massachusetts Institute of Technology—were closing their analytical programs. Harris returned to the U of A in 1958 and held steady to his chemistry convictions. He began recruiting and fostering an analytical program that would be the envy of universities around North America.

"Walter championed analytical chemistry at this university—without him it would be gone," said Ron Kratochvil at the U of A in 1998. Kratochvil was an analytical chemistry recruit who teamed with Harris to publish the seminal textbook *An Introduction to Chemical Analysis*.

"There's a huge need for analytical chemistry now for the kind of work our people are doing," Kratochvil said at the time. "It's just growing in all directions. The analytical chemistry program here is the best in Canada, and, I'm told, among the top three in North America. None of it would have happened without Walter Harris and his battle to preserve it here."

In his first decade, Harris developed the first instrumental methods of analysis course in Canada that still bears his name. Harris would serve as chemistry department chair from 1974–1978. During his career he contributed to 25 scientific advisory councils and played a leading role in the proper disposal of Alberta's hazardous wastes. Harris was named to the Order of Canada, was a fellow of the Royal Society of Canada, received two honorary degrees and served as an active professor emeritus at the U of A from his retirement in 1980 until his passing.

"He had a keen ability to see clearly," said Jed Harrison, chair of the chemistry department. "After retirement, Walter consulted for the provincial and federal governments, the university, Atomic Energy Canada, to name a few, playing a crucial role as an advisor that was quite important and was a large part of what earned him the Order of Canada. Those kinds of invitations spoke to the clarity that he did have."

Harrison says he remembers a generous man who always gave his time, insights and thoughts about things freely.

"It's striking how much his passing has impacted current and former members of the department," said Harrison. "It is clear from the sadness over his death just how much he meant to our department members."

- With notes from previous New Trail and Folio stories.

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