science contours

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The science of PERSPECTIVE

Dan Riskin looks at questions and possibilities Page 16

UNIVERSITY OF ALBERTA

science contours

Vol 31, No 2, Winter 2014

Science Contours is published twice a year by the Faculty of Science office to provide current information on the many activities of faculty and alumni. The magazine is distributed to alumni and friends of the Faculty.

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Faculty of SCIENCE University of Alberta

Cold enough?

Glaciologist and newly named Fellow of the Royal Society of Canada Martin Sharp partnered with photographer James Balog to conduct the Extreme Ice Survey (EIS), chronicled in the award-winning documentary *Chasing Ice*. (p. 10)

contents

Moose tracks

Acclaimed ecologist, Mark Boyce, has designed a smartphone app to record daily observations by moose hunters in the field. This citizen-science method promises to save millions of dollars in monitoring costs so these revenues can be better invested in conservation programs. Learn more at www.biology.ualberta.ca/moose

Cool science

Science grad and *Daily Planet* host Dan Riskin will be on campus in January to present a public talk called Cool Science at the Alumni Association's Winterfest. Riskin has learned a lot about science, first as a bat biologist with an interest in their aerial maneuverability, and then as a convener of discovery conversations on television. Riskin has recently started working in research again, as an adjunct professor at the University of Toronto, Mississauga.

Science, perspective, and a road map for engagement

THIS ISSUE OF CONTOURS is dedicated to science and to how some of the bigger conversations are transpiring to make science a larger part of shaping cultural perspectives in the world.

We caught up with Dan Riskin to talk more about this as one of the most visible moderators of public conversations about science. As the host of the television show *Daily Planet*, Dan reaches a large national and international audience, engaging viewers with his insatiable curiosity and with his passion for science.

While Dan continues to draw people into conversations about science, we can see how his work fits into our Faculty's tradition of excellence in engaging with culture and community. Allan Nursall, the President and CEO of the TELUS World of Science Edmonton, said it well when he was asked, "*Daily Planet* has three U of A grads—you, Dan Riskin, '97 BSc, and Jay Ingram, '67 BSc, '09 DSc (Honorary). Is it a secret society?" He answered: "It's simply a testament to the outstanding science education you can get at the U of A. I think the U of A should take all the credit it can get from that."[1]

You'll be able to catch Dan in person when he comes back to Edmonton in January to give a public talk on "Cool Science" for the Alumni Association's centennial Winterfest celebration. I hope you can join us.

With students who are prepared and empowered to shape and influence the world by gaining an excellent education from the Faculty of Science, you don't have to look far to see how this has happened. We are delighted that Brian Jones (earth and atmospheric sciences) and Don Page (physics) have been awarded the title of Distinguished University Professor, the highest accolade that the University can bestow on a faculty member. This is in recognition of their long, successful careers spent engaging the research community with new insights, enthralling a generation of learners by imparting their passion for science, and building a legacy through the graduate students that they help train. In addition, Mark Boyce (biological sciences) and Martin Sharp (earth and atmospheric sciences) have become Fellows of the Royal Society of Canada, a capstone achievement in recognition of their outstanding careers. And, not to be outdone, we have a new Killam Professor in the Faculty of Science; Yingfie Yi (mathematical and statistical sciences) replaces the retired David Schindler in this prestigious position. Yingfei is already having impact, engaging students both locally and internationally as he works to build a world-class research group in mathematical systems.

So that we can continue to excel at preparing our students to lead in research, in working with communities and in a myriad of ways in and with industry, we are digging into the final stages of our new strategic plan for 2015-2020. This plan is the result of eight months of working closely with faculty, staff, students, alumni, donors, and industry. Not surprisingly, a major theme that emerges from this exercise is engagement – engaging our students with leading-edge learning experiences, interacting with alumni in new and meaningful ways, partnering with government and industry, and participating in the community. We have focused on 10 ambitious goals that will require considerable effort to achieve, but making progress on them (even if not completed in the five years) will have significant impact on our long-term future. Stay tuned for more details, or check out science.ualberta.ca/stratplan. ▶

— Jonathan Schaeffer
Dean of Science

1. *New Trail*, Spring 2014

Safer **cell phone** driving

It's possible when caller views the driving scene

A new study by Kyle Mathewson, a new faculty member in the Department of Psychology, and colleagues at the University of Illinois has shown risks associated with driving while using a cell phone can be significantly reduced when the conversation partner is shown live video from the driver's perspective.

The study, published in *Psychological Science*, was born from a Skype conversation Mathewson had with his brother during a long drive: "I decided to show him video of the road as we spoke, and we brainstormed about how this might help to make our conversation less distracting as he could see the important events on the road."

The study took place in a driving simulator and tested four different scenarios: the driver alone in the car, in the car with a friend, or with the friend on speaker phone from another room (with and without video). As expected, speaking to someone on a cell phone while driving was the most dangerous since they had no awareness of what was going on inside or outside the car. "The hands-free phone was detrimental to driving performance and caused increased collisions with merging vehicles," says Mathewson.

Mathewson says the video technology could eventually be integrated into vehicle designs.

However, when the conversation partner was shown a view of the driving scene and the driver's face, the chance of collision lowered to match the scenario in which the friend was a passenger in the car. "The friend could now identify obstacles, warn the driver, and stop talking so the driver could focus," explains Mathewson.

Mathewson says the video technology could eventually be integrated into vehicle designs. "We hope to get sponsorship from the automotive or insurance industries in order to study the feasibility of implementing these technologies and organizing testing in realistic or real driving situations."

Kyle Mathewson was previously a Postdoctoral Fellow at the Beckman Institute at the University of Illinois at Urbana-Champaign and in the Department of Psychology at the University of Alberta. His current research at the U of A involves using human behavioural studies, neuroimaging and electrophysiological recording to gain understanding of the visual attention system.

Students take classroom success to the boardroom

Sometimes, words click. That's the whole point of Creative Online Writing, or COW, the first educational app developed by startup venture Alieo Games. COW is an online app designed to improve the language skills of students in grades 3 to 8 by making writing fun and interactive. Alieo Games was founded by UAlberta computing science PhD student Kit Chen along with classmates Neesha Desai and Nathaniel Rossol, and retired teacher Chris McMahen, after sketching out the idea for a writing app last fall.

The startup business was the winner of this year's TEC VenturePrize student business plan competition, worth $20,000. "None of us had started a business before and it really frightened us. We had an idea and we didn't know if was commercially viable or how far we wanted to take it," Desai explains.

Stepping outside the comfort zone is starting to pay off, with Alieo Games participating in local hackathons, attending the Fireside Chat series of business startup seminars, and pitching to investors. The company has officially incorporated and the team has even expanded to include a graphic designer.

"There's a real pull out there for quality educational technology that can help students improve literacy and language skills."

To learn more about Alieo Games or demo the educational app, contact exec@alieogames.com.

NEW CAIP RESEARCH CHAIR

A newly appointed provincial research chair at the University of Alberta will examine the relationship between gut bacteria and human health.

Jens Walter (biological sciences) was recently appointed the Campus Alberta Innovates Program (CAIP) Chair in Nutrition, Microbes and Gastrointestinal Health. His position is a joint appointment between the Faculty of Agricultural, Life and Environmental Sciences and the Faculty of Science.

Walter is bringing two research programs with him to the U of A. The first will examine the symbiotic relationship between gut microbes and their host, and explore the evolutionary processes that have shaped this partnership. The second aims to identify how diet affects the microbial communities in the gut and their consequences on human health.

Walter estimates the projects will take about a year to develop before beginning the research, and anticipates he will eventually design dietary strategies to target gut bacteria.

Walter was most recently a faculty member at the University of Nebraska. He was hired there in 2006 and obtained tenure in 2012 after spending two years as a research associate and completing a post-doctoral fellowship at the University of Otago in New Zealand. He earned his PhD in his native Germany, at the University of Hohenheim.

Above: Jens Walter

UAlberta computing science PhD students (L-R) Kit Chen, Nathaniel Rossol and Neesha Desai co-founded educational app startup Alieo Games, winner of this year's TEC VenturePrize student business plan competition.

New-era electronic research attracts wide support

Nano engineering front runner Robert Wolkow is ushering in a new era of electronics —and his efforts have just been given a $2.7 million boost. Venture supporters include Lockheed Martin Canada and the Government of Alberta as part of a new technology commercialization memorandum of understanding, the National Research Council, the National Institute for Nanotechnology and the U of A. The support goes to the spin out company Quantum Silicon Inc. (QSI) that aims to commercialize the technology.

"Our goal is to make ultra-low-power electronics because that's what is most demanded by the world right now," explains Wolkow, a physics professor and AITF Chair in Nanoscale Information and Communications Technology in the Faculty of Science. "We are approaching some fundamental limits that will stop the 30-year-long drive to make things faster, cheaper, better and smaller. An entirely new method of computing will be necessary."

Their first goal is to create hybrid technologies—adding atom-scale circuitry to conventional electronics such as GPS devices or satellites, given the time-intensiveness of making the new circuits. It could take a decade to mass-produce atom-scale circuitry, but Wolkow says, "it has the potential to totally change the world's electronic business. It's a trillion-dollar prospect."

Mark Boyce

2014 Royal Society of Canada Fellow

In recognition of his lifetime achievements in wildlife ecology, and for advocating for threatened species by shaping conservation policy

By Sandra Robertson / Photos by Mark Boyce

MARK BOYCE, Alberta Conservation Association Chair in Fisheries and Wildlife in the Department of Biological Sciences, has earned a reputation as a world leader in population ecology and conservation biology. His work, which links theory and application to some of the world's highest-profile conservation issues, has helped to guide and shape policy in the US and Canada.

In addressing the rapidly changing realities of wildlife populations, Boyce has been asked to provide expert testimony before the United States Congress on three occasions: on conservation of the Northern Spotted Owl, on wolf recovery in Yellowstone National Park, and on the need for a science mandate for the U.S. National Park Service. His work with spotted owls resulted in a reform of forest management in the U.S. Pacific Northwest, redirecting $18 billion from the unsustainable old-growth timber industry to local economies and conservation priorities. His contributions to the integration of wolves from Alberta into Yellowstone National Park and central Idaho resulted in the species' removal from endangered species protection in the U.S. in 2012.

Boyce has authored more than 200 publications, including six books, on population biology and ecological modeling.

In Canada, he has provided legal testimony on conservation of the greater sage-grouse. Following his efforts, Environment Canada issued an Emergency Protective Order, forcing the hand of the provincial government that refused to take action to protect the species. Also as a result of his research and role on the Grizzly Bear Recovery Team, in 2010 the grizzly bear was listed as a threatened species in Alberta by the Minister of Sustainable Resource Development.

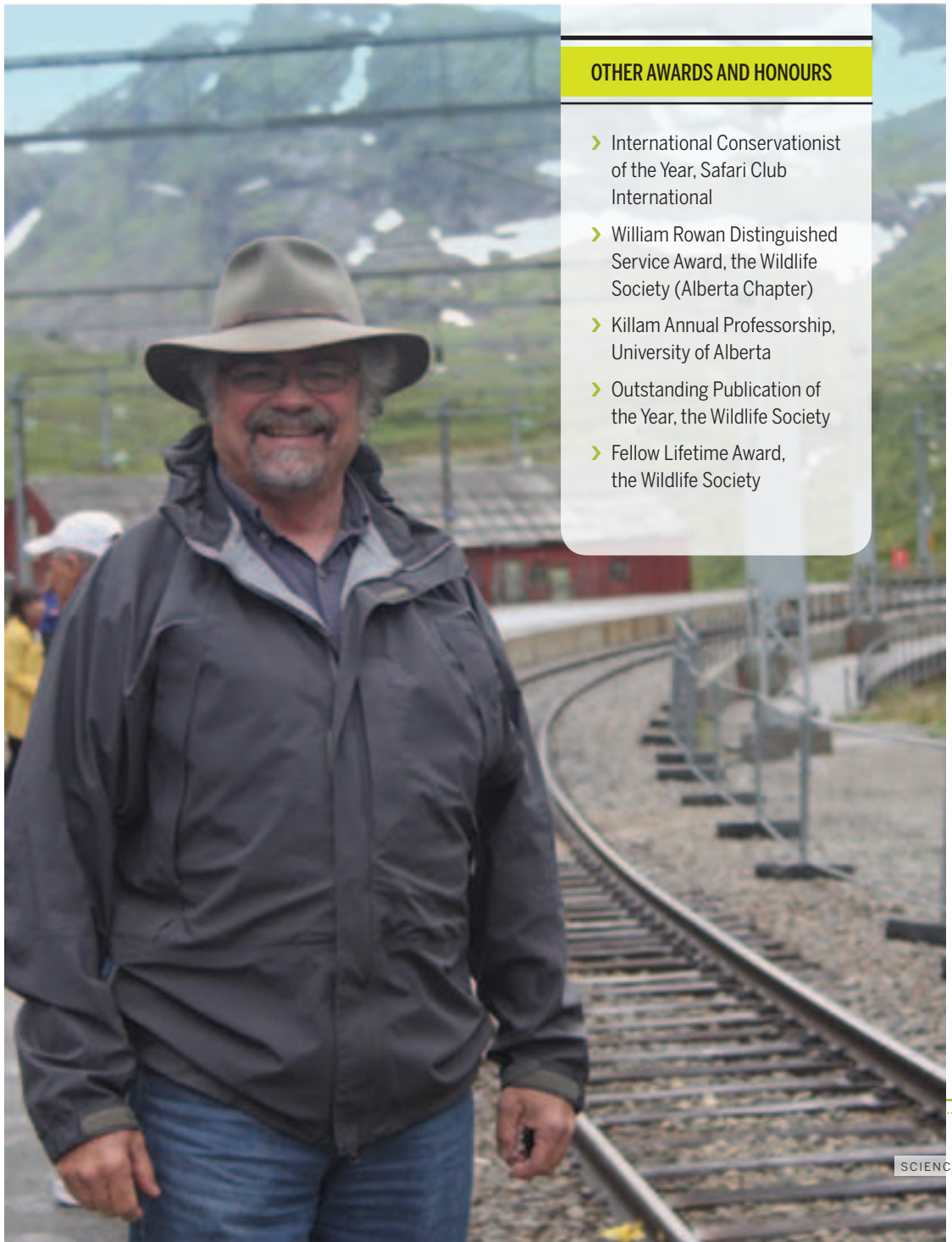
"Despite the alarming pace of industrial development, Alberta still hosts some of the most spectacular wildlife resources on the planet," says Boyce.

Boyce has authored more than 200 publications, including six books, on population biology and ecological modeling that have been cited 14,000 times, as an indication of the huge contributions he has made in applying basic science in stochastic demography, population viability analysis and modelling approaches for habitat ecology.

He also uses innovative methods to engage the wider public, including writing a popular column in the monthly *Alberta Outdoorsmen* magazine in which he explains ecological research to a broad audience. ▶

"Most satisfying for me has been the opportunity to conduct applied research that really makes a difference for wildlife conservation."

— MARK BOYCE



OTHER AWARDS AND HONOURS

- International Conservationist of the Year, Safari Club International
- William Rowan Distinguished Service Award, the Wildlife Society (Alberta Chapter)
- Killam Annual Professorship, University of Alberta
- Outstanding Publication of the Year, the Wildlife Society
- Fellow Lifetime Award, the Wildlife Society

Did you know?

Boyce's Moose Survey app records daily observations by moose hunters in the field.

Every evening, moose hunters are prompted to enter the number of moose they've seen that day into the app. When a hunter draws a moose license, the provincial government asks them to download the Moose Survey app for use when hunting. Data are beamed to a server at the University of Alberta, and tallied at the end of each hunting season to provide an index of relative abundance of moose in each Wildlife Management Unit.

The Moose Survey app is drawing a great response on moose sightings and is available in Apple's app store or online for Android users. The potential savings of using citizen-science methods in monitoring could free up money better invested in conservation programs.

Read more about the app on page 4.

Martin Sharp

2014 Royal Society of Canada Fellow

By Sandra Robertson / Photos by James Balog

In recognition of his lifetime achievements in research and for guiding public understanding of our changing climate

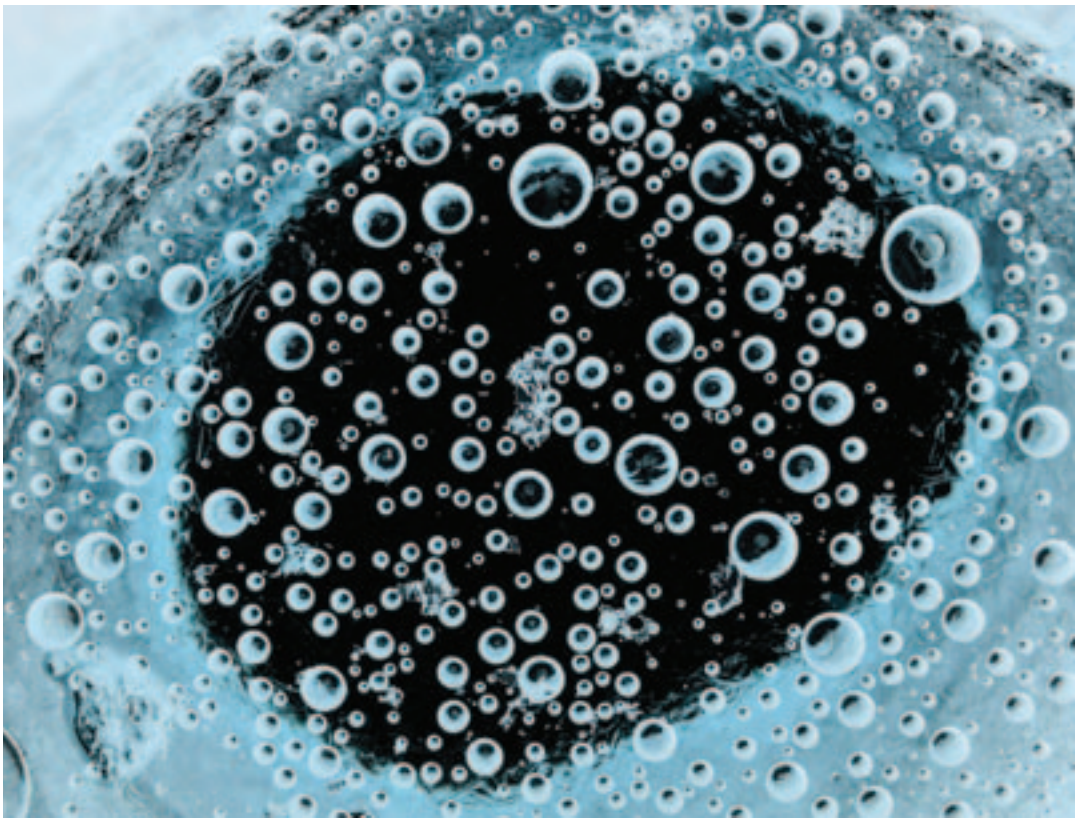
"Changes in Canada's Arctic glaciers over the past decade have made a major contribution to the current rate of global sea level rise, and we have been able to document and explain this."

MARTIN SHARP, professor in the Department of Earth and Atmospheric Sciences, has been named a Fellow of the Royal Society of Canada for his international leadership in documenting and providing a voice for the scientific evidence that describes the environmental changes emerging in our changing world.

Sharp's benchmark contributions have shaped our understanding of high-latitude ice masses including quantifying their meltwater contribution to global sea level rise—an issue with enormous societal implications as more than 600 million people live within 10m elevation of current sea level, and 270 million people and $13 trillion US of assets are

directly exposed to the 1-in-100 year extreme sea level (the sea level that has a 1% chance of being exceeded every year)

"Changes in Canada's Arctic glaciers over the past decade have made a major contribution to the current rate of global sea level rise, and we have been able to document and explain this," says Sharp. "The intensity of summer melting on these glaciers in the 2000s has been the highest in the past 2000 to 4200 years, and close to that experienced during the Holocene Temperature Maximum over 9000 years ago. The signal of radiative forcing arising from human activities has been clear in the mass balance history of glaciers in Arctic Canada since the mid-1980s."



OTHER AWARDS AND HONOURS

- Sharp was named a Leopold Leadership Fellow at Stanford University in 2008 for his leadership in communicating the science behind climate change during the environmental controversy surrounding Canada's ratification of the Kyoto Protocol in 2005.
- His research is supported by the National Science and Engineering Research Council of Canada, Alberta Innovates Technology Futures, and by Canada's Polar Continental Shelf Project.

Sharp's insightful and highly connected research focuses on the links between glaciers, the atmosphere and oceans, how water under glaciers affects their flow, how atmospherically deposited pollutants are transferred from glaciers to downstream aquatic ecosystems, and how carbon is cycled in glacial environments.

In addressing a global issue that spares no one, he has conducted his research on glaciers in Iceland, Alaska, Norway, and the European Alps. These days, he carries out fieldwork in the Canadian high Arctic and Antarctica. ▶

Did you know?

Martin Sharp was a scientific advisor on the award-winning documentary, *Chasing Ice*.

The acclaimed James Balog film tells the story of the Earth's changing climate. The film is based on the images collected as part of the Extreme Ice Survey, a series of revolutionary time-lapse cameras placed across the brutal Arctic to capture a multi-year record of the world's changing glaciers. Since its debut in 2012, *Chasing Ice* has been screened around the world in over 172 countries, 70 universities, over 75 film festivals, the White House, and even the United Nations. The film recently received the 2014 News and Documentary Emmy award for Outstanding Nature Programming.

Winning more than awards

THE JOURN OF AN UNDERGRAD

BY KRISTY CONDON

SET ON ACHIEVING HIS DREAM

of becoming a world-famous heart surgeon, Shehzad "Shez" Kassam took his goal of getting into medical school seriously, pursuing any and all opportunities he could find to strengthen his CV. However, after his first year of studies, Kassam landed a summer research studentship working on a project focused on understanding cultural barriers for international medical graduates coming to Canada—and the experience initiated a major perspective shift for the undergrad.

EY

> "I think participating in these programs would allow students to become more aware of the world around us. We are so prone to being narrow-minded in our lives and focusing so much on our own problems that we forget about the struggles that others face."

Peter Lougheed's son Stephen Lougheed (left) presents Shehzad Kassam (right) with the scholarship that bears his father's name.

AS A FIRST-GENERATION CANADIAN, Kassam understood many of the struggles that his own family faced when they arrived in Canada, and found that the research topic resonated deeply with him. "It is hard to continue thinking about myself when I know that people in our own communities, and especially around the world, may never have the same fighting chance simply due to their circumstances," he says. "Before, I had only considered a career which would benefit me the most—and now, I see my future career as a chance to make a greater difference in the world."

The next year Kassam shifted his priorities toward achieving his new goal, and began working with immigrant communities to conduct research on maternal health and leading support programs for youth from low income families. He also participated in the Unite for Sight program in Ghana, a non-profit organization that supports local eye clinics in Ghana, Honduras, and India in their outreach programs and fundraises for surgeries for their patients.

As a volunteer with Unite for Sight, Kassam worked closely with the clinic staff by conducting patient histories and visual acuity exams, observing an optometrist during their evaluations, and assisting with distributing proper prescriptions or medications.

"Not only was this my chance to be exposed to global health," he says, "but it also let me see how my parents and grandparents grew up in Africa."

His altruistic efforts did not go unnoticed. Two years in a row, in both 2013 and 2014, Kassam was one of just five elite students annually awarded the University of Alberta's prestigious Peter Lougheed Scholarship. Although initially surprised to be selected for the award, Kassam believes he won because he was doing things he was genuinely passionate about. "There may not have been big fancy titles in the positions I held while volunteering," he says, "but each experience connected closely to who I am, what I enjoy doing, and how working with less privileged communities is what I hope to do throughout my career."

Now entering the fourth year of his BSc Specialization in Psychology, Kassam hopes that other students will follow his lead and choose extracurriculars that intrigue them, rather than ones they feel obligated to take on. "I think participating in these programs would allow students to become more aware of the world around us. We are so prone to being narrow-minded in our lives and focusing so much on our own problems that we forget about the struggles that others face." ▶

Did you know?

The Faculty of Science is home to the first University of Alberta semester study abroad program based in Africa. The Southern African Field School (SAFS) is a University of Alberta accredited field school, providing students with the opportunity to take for-credit University of Alberta Science courses in Swaziland, South Africa and Mozambique. The program offers life changing educational experiences for undergraduate students in Ecology, Marine Ecology and Directed Research. Students connect with local communities, develop international networks, and learn to generate poignant research questions that will inspire future development in Africa. **For more information, visit: science.ualberta.ca/africa**

SOUTHERN AFRICAN FIELD SCHOOL

The science of PERSPECTIVE

Q/A WITH ALUMNI DAN RISKIN

BY ALAN SHAPIRO PHOTOS BY MATTHEW PLEXMAN

DAN RISKIN ('97 BSc), host of the Discovery Channel's *Daily Planet*, has travelled the globe to share conversations about science—an inspiration to fellow science grads like Alan Shapiro ('13 BSc), who touched base with his mentor to talk science perspectives. "It's about getting people excited about the questions and the possibilities," says Riskin. "We look for the conversation that everyone's having and ask how science can add to that."

In knee deep

Just a normal work day for Riskin, wading in the Don Valley Brick Works pond in Toronto.

Q/A

> "Like Bill Nye said: You can learn something from everybody."

Q What has been your biggest lesson since stepping out of research and into the public conversation about science?

A **THE BIGGEST MISTAKE** is assuming that because I'm a scientist, I know more about communicating science than others. It's not about having the upper hand—I'm just learning how to communicate. The very idea of understanding a scientific concept is beautiful. The next step is teaching people to share that understanding. A couple of years ago, my stepmother Bethany told me about a news article she read that involved bats' lungs exploding when they fly near wind turbines. I dismissed it as absurd. In my head, I was thinking: I'm a bat expert and that sounds dumb. Turned out, a new paper had found that sudden low pressure zones can cause severe lung trauma in bats, like a scuba diver swimming up too quickly. She was right, but I didn't give her the same reaction I would've given a scientist. I always try to remember that there's no "king of the castle". Like Bill Nye said: You can learn something from everybody.

Q What would you say to kids who don't like science?

A I struggled with math in high school and university. Once I'd taken calculus in my undergrad, I thought it was done. But when I was in Cornell writing my PhD, I had to take several calculus classes. I was competing with engineers and brilliant minds from all different backgrounds, and it was marked on a curve. Once I really started trying, I realized that I not only could do math but that I loved it. I want to go back and tell my grade 8 self just to try a little harder.

> "The very idea of understanding a scientific concept is beautiful."

Q. Where does the connection between science and the community begin?

A. Science citizenship starts by connecting fun characters on TV like Neil DeGrasse Tyson to real scientists. I mean, that's what scientists do. Neil DeGrasse Tyson still publishes papers. People need to understand that without scientists, there would be no Shark Week.

Q. Have you had any "lightbulb moments" in your time on the show?

A. A real lightbulb moment was a recent Reddit "Ask Me Anything" I did that made it to the front page. Someone commented that it was *Daily Planet* that got him excited about engineering, and that's what he ended up doing as a career. I'm hoping that we can turn people into day-to-day scientists.

Q. What's been your coolest experience at *Daily Planet*?

A. The coolest experience hands down was being at NASA's Jet Propulsion Laboratory when Curiosity landed on Mars. It was the most exciting thing. Watch the promotional video—it seems like the craziest, most ridiculous way to land anything ever. I was sitting with other press members getting a play-by-play. When it landed, we were hugging and cheering. I can only imagine what it was like in the control room.

Q/A

Q Are there any books that influenced you when you were young?

A It's not so much about *what* you read. I liked Douglas Adams and Kurt Vonnegut. *The Selfish Gene* by Richard Dawkins was a real revelation for me. But I don't want to give kids a "bible." I want them to become readers. And if they pick up *The Selfish Gene* as one of twenty books they read in a year and either like it or dislike it, it's not a big deal because they are reading and enjoy reading. If you don't like reading, then you're reading the wrong stuff.

Q Have you ever regretted moving away from research?

A There are no wrong turns in a career path. Moving away from academia has surprised me in the way the science itch has been scratched by my job at *Daily Planet*. The topics I'm exposed to are broader but not as deep. But through that process, I've realized how much interesting knowledge there is in fields I was never exposed to before, like astronomy and chemistry. Part of my role as a scientist-turned-science communicator has also been to act as a bridge between academia and the public. Academia tends to be an elite club, and scientists are more willing to listen to one of their own.

“ I’m hoping that we can turn people into day-to-day scientists.”

Q. What was it like publishing your first book?

A. Writing a book is easier than writing a scientific paper. You can put more effort into getting ideas across instead of worrying so much about every sentence standing up to a panel of grumpy journal article reviewers. Also, since I share the final product of *Daily Planet* with 60 to 70 other people who also get a say, it was really nice to have a project over which I had total control.

Q. Any future projects you’re excited about?

A. Actually, I’m starting work as an adjunct professor at University of Toronto Mississauga. I’ll be working with a professor there, John Ratcliffe, connecting bat echolocation and flight. I’m excited to start telling stories together. I also want to write more books, but I’m not sure what yet. There’s definitely a bat book in the pipeline somewhere. As far as TV, I want to keep improving as a communicator. Eventually, I want to be the Leonardo DiCaprio of science communication.

One great thing about having a book out is that it’s started a conversation with a lot of readers that I get to continue when I meet them. I’ve done radio interviews, TV hits, and public talks where people pick up on the themes I’ve explored and take things further. That’s been really rewarding and I’m looking forward to doing more of that. ▶

Cool Science

Don’t miss Dan Riskin in Edmonton on January 29, 2015, where he will share ultra-cool stories about science and mother nature, as a part of Winterfest—the University of Alberta Alumni Association’s 100th Anniversary celebration.

Thursday, January 29, 2015
7 – 9 p.m.
Convocation Hall,
Arts Building
Cost: $10

Visit **uab.ca/winterfest** to register, and for more information about this and other Winterfest events.

LIFE AND TIMES

Dan Riskin is a renowned bat biologist as well as host of Discovery Channel’s *Daily Planet*. His fascination with bats has taken him from Costa Rica to Madagascar.

He earned his BSc from the University of Alberta, an MSc from York University, and a PhD from Cornell University before doing postdoctoral work at Boston University and Brown University. He also worked as an assistant professor at New York’s City College, and he will be continuing his academic career as an adjunct professor at the University of Toronto Mississauga.

Riskin has published in prestigious journals, is the recipient of multiple teaching awards, and has appeared on various science television programs including *Animal Planet*, *The Tonight Show* with Jay Leno, and *The Late Late Show* with Craig Ferguson. In March 2014, he released his first book, *Mother Nature is Trying to Kill You*—a light-hearted venture into the lesser-known dark side of the natural kingdom. The book has found its way onto the *Toronto Star* and *Globe and Mail* bestseller lists. Riskin and his wife, Shelby, have three children: three-year-old Sam and newborn twins Linnea and Wallace.

Fourth-year science student Jeff Tao on being human in Edmonton

WITH HIS DAD AS HIS INSPIRATION, Jeff Tao volunteered in Africa one summer. He came back to Canada with a conviction to reach out more. "Life was so hard there, but people were happier than they are here because they open up to each other."

Taking cues from the popular photo blog *Humans of New York*, Tao started two regional Facebook blogs, *Characters of the City: University of Alberta* and *Characters of the City: Edmonton*. Through the blogs, Tao employs the distinctive, intimate Q & A format to share probing questions with strangers—opening up Edmonton's common humanity with 6,000 followers.

Tao is applying to medical school for next fall and hopes to spend his career caring for underserved communities abroad. ▶

"I try to live like my dad every day; his motto is to be loving, caring, and giving. He came to Canada when he was young and trained as a physician as a new Canadian. I know it wasn't easy, and now, the way he chooses to live his life is humbly and with compassion."

BY SANDRA ROBERTSON PHOTO BY JOHN ULAN

SCIENCE STUDENT BUILDS COMMUNITY BY ASKING QUESTIONS

facebook.com/charactersofthecity
facebook.com/cotcedmonton

Raising the voices *of* science

After five years developing and delivering programs for young aboriginal students with WISEST, ***Jen Duffy*** *has recently moved to Toronto to begin working with the Jane Goodall Foundation.*

BY *Kristy Condon* PHOTO BY *John Ulan*

Jen Duffy's words of advice:

- Don't believe anyone who tries to tell you that you can't! You have a perspective that is currently underrepresented, and that makes you very valuable.
- Spend as much time outside as you can. Rekindle your relationship with the land. Live with the Earth, not just upon it!
- Travel. The world is full of awe, wonder and perspectives other than your own so get out there and be open to its lessons.

WHEN ASKED TO NAME NOTABLE WOMEN in science, most people can cite only two: Marie Curie and Jane Goodall. Jen Duffy ('98 BSc, '02 MSc, '10 BEd), ambassador for diversity in STEM (Science, Technology, Engineering and Mathematics) education, is working to change that.

"Science is strengthened by engaging and empowering those with perspectives that are underrepresented in it," says Duffy—words she lives by, from her work coordinating aboriginal outreach programs at the U of A with WISEST (Women In Scholarship, Engineering, Science and Technology), to her newest role as education manager with the Jane Goodall Institute of Canada (JGI Canada).

She dreams of a future where everyone can find equal opportunities in science education. "I believe we tend to still spend too much time talking about the situation—showing

"Science is strengthened by engaging and empowering those with perspectives that are underrepresented in it."

the stats, lamenting the challenges," she says. "While these are all very useful in terms of background, it is time to start making changes."

And make changes, she has. During her time with WISEST, Duffy established "Tales from the Science Buffalo", a program honouring Aboriginal Ways of Knowing in touring science programs to sixth-grade classrooms in Fort Chipewyan and Anzac. "Having students in these communities learn to love doing science — and then tell me they want to be paleontologists, mechanical engineers, or astronauts was absolutely fantastic," she says.

"The best teachers let me believe I can be anything I want to be no matter where I come from or what sex I happen to be, which is a value I try to instill in all students that cross my path."

Building on her experience with "Science Buffalo", Duffy went on to develop "Providing Safe Passage to Knowing", an educator workshop designed to equip teachers with practical ways to honour Aboriginal perspectives in their science classrooms.

A three-time grad from the U of A, Duffy has always been fascinated with the diversity of the natural world. She describes herself as "the kid who brought frogs and turtles home to my backyard and who dissected my fish when they died," and she's taken this fascination along with her—celebrating diversity, in people and in the wonderful world around them.

Her new role at the JGI Canada gives her a venue to educate and inspire people to live more sustainably. "I probably won't reach all of humanity in my first year," she says, "but I will be inspiring and equipping Canadian educators to cultivate a generation of change agents."

Although admitting she has had so many mentors she wouldn't know where to start, Duffy names Margaret-Ann Armour, founder of WISEST and Associate Dean of Diversity for the Faculty of Science, and Maria Klawe, president of Harvey Mudd College and fellow U of A science alumna, as two women who continue to lead the way for women in science today. "The best teachers let me believe I can be anything I want to be no matter where I come from or what sex I happen to be, which is a value I try to instill in all students that cross my path." ▶

Leah Hackman *Game Girl*

Computing Science PhD student Leah Hackman lends her technical expertise and cultural insight to ***Understanding Video Games****, the U of A's latest MOOC.*

BY *Caitlin Cranshaw* PHOTO BY *Ian Jackson*

Leah Hackman ('08 BSc, '12 MSc) didn't grow up with a burning desire to code—in fact; her family didn't own a computer for most of her childhood.

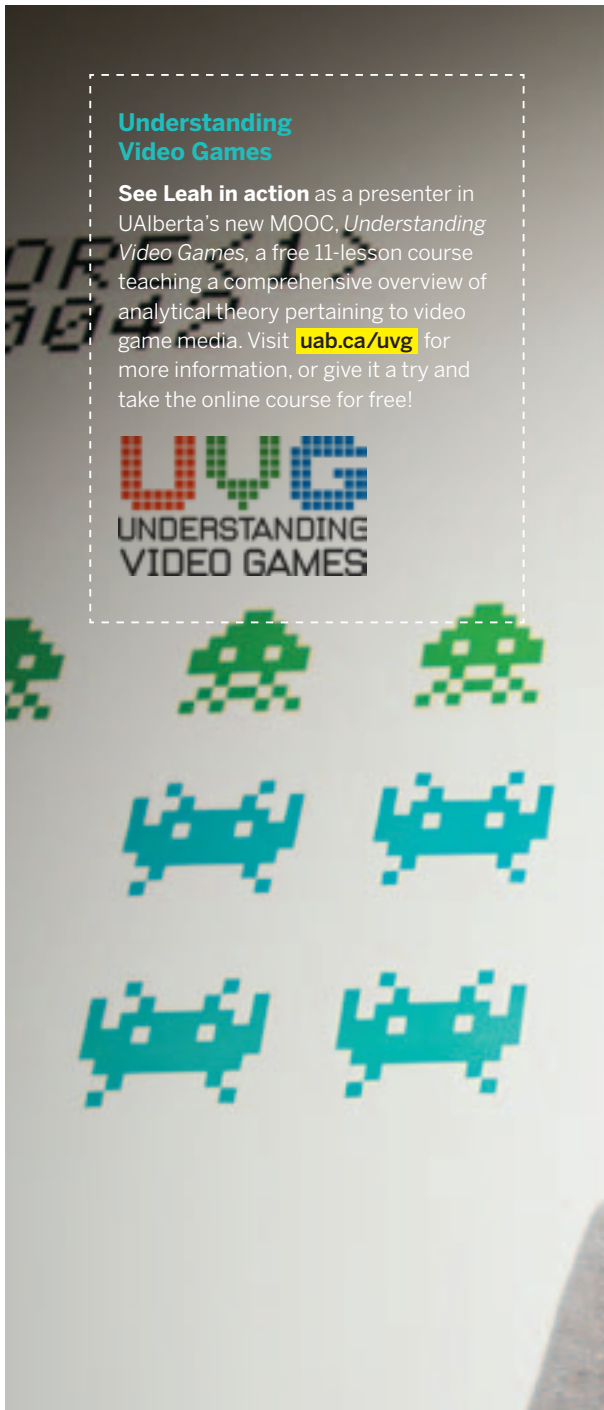
But everything changed in high school when a teacher encouraged her to apply for a summer program at the University of Alberta. The WISEST Summer Research Program, offered through Women in Scholarship, Engineering, Science and Technology (WISEST), pairs bright young women with researchers in traditionally male-dominated fields. Over the course of a summer, Hackman assisted with an actual computing science research project, sparking a fascination with both programming and research. "I probably wouldn't be in computing science now if I hadn't done it," she says. "I didn't know anything about computing science before that—I didn't even know it was a discipline on campus."

After earning bachelor's and master's degrees at the U of A, and spending some time working at a small company, Hackman began her PhD in computing science this fall. She's also teaching, and recently helped humanities computing professor Sean Gouglas deliver the University of Alberta's second MOOC (Massive Online Open Course): *Understanding Video Games* (UVG). For this role, she actually had to audition, drawing on her experience in local theatre as a child.

Like the first UAlberta MOOC, *Dino 101*, UVG was originally taught (and filmed) in a bricks-and-mortar classroom for course credit. While still being offered in this format, it's now also available online for credit and as a non-credit class to anyone in the world with an internet connection.

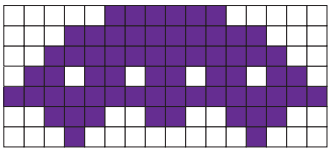
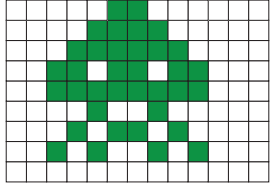
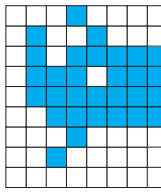
Regardless of how students choose to participate, the course material is the same. "They're learning how to critically approach video games as an actual text—an actual medium you'd interact with on a scholarly level," says Hackman. To that end, the course involves analyzing everything from technical elements to the game's narrative.

The class also examines video games and the culture around them, including how women and minorities are represented. Even though a large number of women play video games (in the U.S., they presently make up 48 per cent of gamers), there's a noticeable lack of fe-



Understanding Video Games

See Leah in action as a presenter in UAlberta's new MOOC, *Understanding Video Games*, a free 11-lesson course teaching a comprehensive overview of analytical theory pertaining to video game media. Visit **uab.ca/uvg** for more information, or give it a try and take the online course for free!

male characters in most games, and many of the existing characters are hyper-sexualized. Racial and sexual minorities as well as people with disabilities are similarly underrepresented.

This lack of diversity has led to online harassment for women, particularly those speaking out on the topic. As a result, women are leaving the industry at higher rates than men.

Pushing video game culture into the scholarly realm "lends some legitimacy to the medium," says Hackman. Courses like UVG also provide safe spaces for serious discussion—free from the trolls that roam the Internet. "I don't expect the trolls will ever go away," she says, but there may be fewer of them. "I think change is happening, slowly."

Hackman is personally dedicated to addressing the problem as the volunteer VP (Outreach) for Ada's Team, a new campus organization supporting women and minorities (including people of colour, those with disabilities, and LGBTQ people) in computing science, video games, and technology. The group screens films, offers tutoring sessions to first-year students, hosts coding events and panels, and more. ▶

Hackman is personally dedicated to addressing diversity in computing science.

ONE HUNDRED YEARS OF FIELD STUDIES @UALBERTA

By Sandra Robertson

THE WORLD IS OUR CLASSROOM

Industry depends on highly trained geologists and geophysicists, so field school training evolves with changing resource needs.

EPIC FIELD LESSONS, EPIC DISCOVERIES

GEO-SCIENTIFIC EXPLORATIONS have played a key role in developing the province and its rich resources—including the discoveries of the Leduc #1 and Pembina Oil Fields—and in evaluating deep earth structures to guide industry practices.

Geology students work with resource industries in coal, gold, silver, copper, uranium, lead, zinc, rare-earth elements, and beryllium across Alberta, BC, the Yukon, and the Northwest Territories.

Geophysics students learn to evaluate the sedimentary structure of Cretaceous rocks and the thickness of the earth's crust, process gravity and magnetic data, apply numerical methods in modelling electromagnetic responses, and develop seismic profiles to evaluate environmental processes and small-scale structures.

The field experience is a premier part of the UAlberta education that enriches students' professional skillset.

RESOURCING OUR DEVELOPING WORLD: THE MAKING OF A GEOSCIENTIST

THE FIELD EXPERIENCE is a premier part of the UAlberta education that enriches students' professional skillset for work in geology and geophysics.

The thousands of University of Alberta students who have participated in field schools over the past hundred years are among an elite and diminishing cohort to have learned the rich lessons that can only be gained by experiencing the complex, naturally occurring formations they are tasked with interpreting.

Field schools need your support

As every geoscientist knows, field schools are a vital part of their training and their university experience. Developing intuitive three-dimensional and field observation skills creates geoscientists prized by industry. The UAlberta graduates remain vital assets to our local and global economies. The Undergraduate Geology Field School Endowment and the Geophysics Field School Fund will support the growing demand for this invaluable and essential training.

For more information about supporting Geology or Geophysics Field schools, please contact Kim Taylor, Assistant Dean of Development in the Faculty of Science, at **780 492 7411**. Or email Kim at **GiveToScience@Ualberta.ca**.

2014 Alumni Recognition Awards

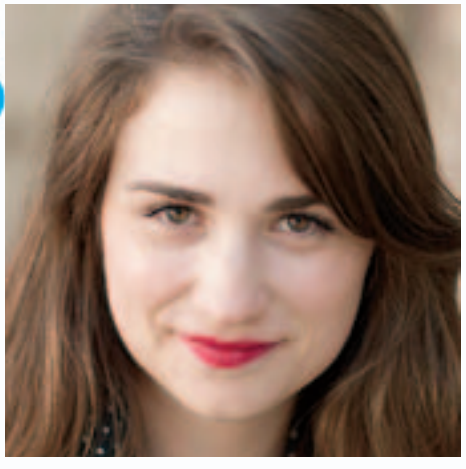
CONGRATULATIONS TO THESE FACULTY OF SCIENCE ALUMNI AWARD RECIPIENTS

Faculty of Science alumni are putting their science educations to work—and shaping the world. The University of Alberta Alumni Awards recognize the extraordinary impacts and celebrate the outstanding achievements of our alumni.

ALUMNI HONOUR AWARD

Murray Campbell ('79 BSc, '81 MSc) has earned a prominent place in the history of artificial intelligence by achieving one of the most significant milestones to date. He was one of the three scientists who created Deep Blue, the IBM computer that beat world chess champion Garry Kasparov in 1997. The success brought international recognition and the $100,000 Fredkin Prize. His work includes systems to use real-time medical data for early detection of epidemics and he leads a team who focus analytics approaches to create a smarter workforce. In 2012, Campbell was named a Fellow of the Association for the Advancement of Artificial Intelligence.

ALUMNI HORIZON AWARD



Megan Engel ('12 BSc, '13 MSc) has devoted herself to an emerging field of nanoscience that exists at the intersection of physics and biochemistry. The recipient of a prestigious Rhodes Scholarship, she is working on a PhD in atomic and laser physics at Oxford, studying photosynthesis as a platform to support near-perfect energy transfer. When these principles are understood they could lead to technologies capable of revolutionizing renewable energy production. Engel demonstrates great determination to solve deeply complex questions in science.

Diane M. Orihel ('13 PhD) is an outspoken defender of freshwater science and evidence-based science policy. In 2012, she stepped into the spotlight when the federal government announced it was shutting down Canada's Experimental Lakes Area research site in northwestern Ontario—the site where University of Alberta professor David Schindler conducted his pioneering whole-lake, systemic ecological research. Orihel , a student of Schindler's, put her studies on hold to lead a "Save ELA" campaign. Her advocacy was successful: the federal government has signed a memorandum of agreement with the International Institute for Sustainable Development to operate the ELA research site and the Manitoba and Ontario governments have offered funding.

Sharon Morsink ('97 PhD) logs hundreds of volunteer hours each year sharing her passion for science with thousands of school children and others from the community. Since earning her PhD in theoretical physics, she has managed her full teaching and research portfolio while also opening the window to the mystery of the universe by hosting free, twice-weekly public viewings and events at the University's campus observatory. While helping to raise scientific literacy in the community and fuelling an interest in science careers, she also had a hand in designing the new Campus Observatory, whose three domes are a striking feature of the Centennial Centre for Interdisciplinary Science. She has also worked with the Royal Astronomical Society of Canada (Edmonton Centre) to fund and build accurate three-dimensional models of the planets, which now hang in the CCIS west atrium.

For more information about the awards and winners, visit: ualberta.ca/alumni/awards.

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