

alumniUBC Trek

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UBC100

UBC100: WHAT'S NEXT?
A day of exploring the future,
featuring William Shatner.
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Kepler-186f

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Jessie Anderson (front row, centre) was UBC's first graduate. (Photo: UBC Archives)

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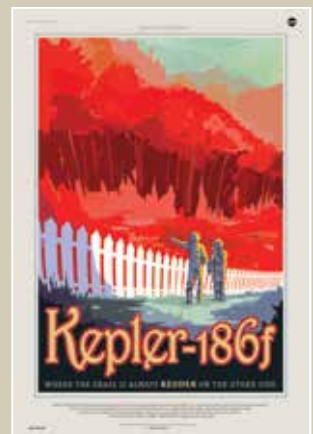


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COVER IMAGE: The cover image is a vacation poster from the Exoplanet Travel Bureau. The poster and the bureau are fictional but the destination is real. Kepler-186f is the first Earth-sized planet discovered in the "Habitable Zone" around another star, where liquid water oceans could exist on the planet's surface. Its star is much cooler and hence redder than our Sun. If plant life grows on Kepler-186f, photosynthesis there may have adapted to red "sunshine," producing a colour palette that's different from the garden greens of Earth. Kepler 186f is one of thousands of planets discovered in the last three decades. UBC astronomer Jaymie Matthews shares this story of cosmic discovery in his article "Setting sights on alien oceans" on page 12. **Image credit: Jet Propulsion Laboratory (NASA/Caltech)**



INTO THE FUTURE

As a kid, I was fascinated by the lives of elderly relatives who had been born in the 1800s. I'd ask them annoying questions: How long did it take you to walk to school? Wasn't life boring before television? How many times did you squish your finger in the clothes wringer? Were there dinosaurs? (That last one earned me a cuff on the ear.)

Now I'm the one who's dated. I still remember the envy I felt in the late 70s when my cousins received a game of Pong for Christmas, and the closest contender in my stocking was a pack of playing cards. In the 1980s it was the height of sophistication to own a Filofax. One day in the mid-90s I sat in front of a friend's home computer (no one else I knew had one yet) while she urged me to type anything - ANYTHING! - into the strange phenomenon of a World Wide Web browser. I regarded early adopters of cell phone technology as anti-social posers, annoying everyone else with their expensive fads and their loud public conversations - but come the new millennium, I shrugged off those Luddite tendencies and purchased my own. It wasn't smart, but it did look like something from *Star Trek*. (I've kept all my old cell phones. You never know - the one with the pull-up antenna might be worth something one day.) As William Shatner observes on page 52, we live in the most exciting time in history. It's especially exciting if you have a comparison - clear memories of a time before computers were ubiquitous, before the World Wide Web, and when change happened way more slowly than warp speed.

Now that human brains are connected to each other via a vast digital nervous system, who knows what new discoveries, toys, weapons and tools will emerge in the coming decades to reshape our everyday lives - for better or for worse. We may find evidence of life on Earth-like planets beyond our Solar System, yet we may have lost polar bears and coral reefs to climate change on our own planet. Medical advances might mean that we no longer lose our loved ones to cancer, and a host of other diseases and genomic misfortunes, but we may find ourselves living under the constant threat of devastatingly effective and highly accessible weaponry. Technology will no doubt make our daily lives easier through a huge range of luxury services and lifestyle gadgets limited only by our imaginations. But will privacy and freedom from surveillance have become impossible to secure?

One thing is for sure: the older I get and the faster things change, the more of an oddity I will become to the young. Great-grandnephews and great-grandnieces will ask annoying questions (maybe while we're on our way to the moon for a family vacation): Are we nearly there yet? Was microfiche a kind of tadpole? What did magnolias smell like? Can I have your antique cell phone collection if you die? Were there dinosaurs then? They won't get a cuff on the ear, but they won't be getting my antique cell phone collection either.

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A day of exploring the future

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For tickets and to find out more, visit
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EMERGING FIELDS AND BREAKTHROUGH DISCOVERIES

How research is changing our quality and experience of life.

Breathing easier through epigenetic research

Can the environment affect our genes? According to a trio of researchers at UBC it can, and it does. Their respective studies in respiratory disease epigenetics have helped make the university a leader in this emerging field, which considers the relationship between our environment and our genes. How we live can, in fact, alter our gene expression in a way that may affect the development of cancer, asthma or neurodegenerative diseases.

Dr. Michael Kobor, a professor at the Centre for Molecular Medicine and Therapeutics, and the Canada Research Chair in Social Epigenetics, wants to understand how the environment affects the packaging process of DNA (each of our tiny cells contains a DNA strand long enough to stretch more than two metres).

To that end, his lab is working with faculties across campus and colleagues around the world to determine how the environment – including socio-economic status – plays a role in gene expression and affects conditions such as fetal alcohol syndrome, asthma and chronic obstructive pulmonary disease.

Other asthma-related epigenetics research includes Dr. Denise Daley's investigation of whether parents' smoking habits trigger genetic changes in their offspring.

Daley, Canada Research Chair in Genetic Epidemiology of Common Complex Diseases, and her team are looking for a type of genetic alteration known as "methylation" – that is, when a carbon and hydrogen compound latches onto part of the DNA and modifies how that cell develops and functions. Their goal is twofold: to prove methylation triggers a cascade of consequences that lead to childhood asthma and/or allergies, and to determine when those changes are triggered.

Then there is research that builds on a previous study, which demonstrated that breathing in diluted and aged diesel exhaust may affect about 400 genes and lead to fundamental health-related changes in the body.

Dr. Chris Carlsten of UBC's division of Respiratory Medicine, and chair in Occupational and Environmental Lung Disease, led the inquiry. Volunteers were placed in a polycarbonate-enclosed booth about the size of a standard bathroom and made to breathe in air-pollutant fumes that were equivalent to driving along a highway in Beijing, or working in a busy port or industrial site on a hot and windless day.

Now Carlsten's team is taking the next step and studying how these changes may be translated to health issues, even when there are no obvious symptoms.



Denise Daley



Chris Carlsten
(Photo: Don Erhardt)

From personalized prescriptions to DNA in space

Innovative. Paradigm-shifting. Out-of-this-world – literally. All different ways you can describe the research of Dr. Corey Nislow in pharmacogenomics – research that is poised to launch us into the future.

Pharmacogenomics is a burgeoning field that combines pharmacology with genomics to generate exciting new applications. Nislow, an associate professor in the Faculty of Pharmaceutical Sciences, is collaborating with Genome BC and the BC Pharmacy Association on a project – the first of its kind in North America – that has the potential to revolutionize healthcare delivery.

By using genomics to predict more accurately an individual's response to a drug and its dosage, the project hopes to eventually usher in a new era of personalized medicine, in which pharmacists can use each person's genetic makeup to make medication use safer and more effective.

Following the sequencing of the first human genome in 2000, scientists have known that genetic information could be used to personalize medicine. "To say it really simply, some of your genes will have variants... that will make you metabolize some drugs quicker than others, make you metabolize some drugs slower than others," or even preclude an individual from metabolizing a drug at all, says Nislow.

Yet, he says, "there hasn't been a healthcare profession that's stepped up and said we're gonna take this on."

This is where pharmacists, working with Nislow's team, are stepping up to the plate. Community pharmacists provide the perfect interface between patients and new prescription practices. And with major technological advances allowing genetic testing to be conducted on a large scale at a much lower cost, the ability to develop a pharmacogenomic approach has never been better.

During the pilot phase of the project, Nislow and his team have partnered with 34 pharmacists at 31 BC pharmacies to recruit patients to participate in

"Usually when we look at the effects of air pollution, we measure things that are clinically obvious – air flow, blood pressure, heart rhythm," says Carlsten. "But asthma, higher blood pressure or arrhythmia might relate to the gradual accumulation of epigenetic changes. So we've revealed a window into how these long-term problems may arise. We're looking at changes 'deep under the hood.'"

And that just might allow us all to breathe easier.

the study and collect their saliva samples. Once the samples reach the UBC Sequencing Centre at Pharmaceutical Sciences, the researchers use next-generation sequencing (NGS) to extract genetic data that can be used to determine how an individual responds to different medications.

While the researchers are looking at all medications where genetics is known to have an impact, they are using warfarin (Coumadin) as a benchmark for this phase of the study. Warfarin is a particularly fitting drug for phase one this study, as it is a long-term treatment with an optimum dosage that varies greatly from individual to individual. There is also a dosing algorithm that uses genetics to determine the correct dosage and delivery interval of warfarin specific to each genome.

A key component of phase one has been working with pharmacists to develop robust operating procedures for sample collection, processing and sequencing. "We're focusing on the mechanics of getting the genome from a pharmacy, bringing it to the lab and decoding it with a high enough accuracy and in a fast enough time frame that you could actually benefit from that information," says Nislow.

If phase one successfully demonstrates the feasibility of pharmacy-based genomic testing, phase two will see an expansion of the project into a wider base of community pharmacies, where pharmacists will begin to implement genetic information into patient drug therapy decisions. With more than 1,000 community pharmacies across the province, there is ultimately the potential for all BC residents to access the testing, regardless of where they live, and for pharmacists in BC to be at the forefront of game-changing innovation.

It's all part of a giant leap forward in delivering medicine in a way that is streamlined and individually tailored, helping to reduce drug therapy costs, manage healthcare sustainability, and most importantly make people healthier.

Another project headed by Nislow seems to veer more towards science fiction than science: he has been sending modified yeast cells up to the International Space Station in order to research how reduced gravity affects human genes. Yeast is an ideal specimen for this type of study, as it has retained enough features in common with human cells over its evolution to still inform human cellular response.

The project has applications both beyond the final frontier and back here on earth, from understanding how reduced gravity will affect astronauts' DNA to discovering ways to mimic DNA damage caused by cosmic radiation in cancer cells that will cause them to kill themselves.

It's exciting stuff – to see the future happening right here at UBC, where discomforts and diseases that affect patients today are on their way to becoming a thing of the past, and how yeast in space could one day help humans land safely on Mars.

Building an environment to combat prostate cancer

Dr. Martin Gleave is a man with many hats. Not only does he head the Faculty of Medicine's Urologic Sciences department, he is also a clinician, renowned research scientist, urologic surgeon, and founder of a UBC spin-off company, OncoGenex Pharmaceuticals.

It's a formidable resume. And that's before you factor in his role as the chief architect of an environment that is bringing together leading researchers to share their expertise to combat prostate cancer,



Corey Nislow and his team have developed strains of yeast that are heading to the International Space Station. (Photo: Paul Joseph)

the most prevalent cancer in BC men and the second leading cause of cancer deaths.

Gleave is the executive director and a leading researcher at the Vancouver Prostate Centre (VPC), a research hub hosted by UBC and the Vancouver Coastal Health Research Institute that he co-founded with prominent cancer researchers in 1998. It has since become one of the world's most respected cancer research facilities. He is also CEO of the Prostate Centre's Translational Research Initiative for Accelerated Discovery and Development (PC-TRIADD), a national centre for excellence in research and commercialization.

Together, these programs have created a collaborative and fertile environment with a rigorous bench-to-bedside philosophy, focused on advancing clinical research discoveries into treatments with minimal delay. It is able to do so by combining strengths in cancer genomics with the research and development of new drugs treatments.

Researchers like Drs. Colin Collins and Yuzhuo Wang are teaming up to pave the way for personalized oncology. By sequencing the genomes of cancer tumours, Collins and Wang, who are senior scientists at the VPC, are predicting more precise and effective anti-cancer therapies, targeting the specific molecular characteristics of the malignant growth. A breakthrough blood test developed at VPC by a team led by Dr. Kim Chi is now allowing the genetic profiling of cancers in patients that is already transforming the treatments they receive.

A recent breakthrough in drug development has revolutionary potential for treating castrate-resistant prostate cancers. The breakthrough was made possible through a collaboration between leaders in seemingly disparate scientific domains. Dr. Paul Rennie is considered a long-established world leader in the biology of androgen receptors, key sites on cells where overexpressed hormones bind and cause prostate cancer. Dr. Artem Cherkasov's expertise lies in *in-silico* or computer-aided drug design, which uses bioinformatics tools to test and develop new drugs, bypassing the lengthy, expensive initial process of drug discovery using classic *in-vivo* methods.

Their discovery takes a completely new approach to treating castrate-resistant prostate cancer. As this form of cancer is driven by the androgen receptor, other drug treatments have attacked prostate cancers by trying to lower production of the male sex hormone, testosterone, or block its binding to the androgen receptor. While often initially effective, the cancer will evolve to overcome these chemical changes and become "castration-resistant," where it adapts to makes its own androgen, cooperate with other survival pathways to support androgen receptor activity, or eventually completely bypass the need for the androgen receptor as a driver gene. To overcome these adaptive mechanisms, Rennie and Cherkasov have designed a drug that, rather than blocking the site where the androgen binds to the androgen receptor, instead blocks the site where the androgen receptor binds to DNA – effectively taking the wheels off the car and putting the cancer "up on blocks" to prevent it developing, regardless of what is happening to the fuel. It is the apex anti-androgen that has caused quite a stir in prostate cancer research circles and an incredible feat of collaboration between some of the most respected researchers in their fields. It is most importantly a discovery that could have life-altering impacts on patients. In December 2015, UBC announced that the discovery had been licensed to Roche, in UBC's largest licensing deal to date.

Advancing the world's bio-economy

With a childhood immersed in British Columbia's breathtaking nature, the forest occupies a special place in Dr. James Olson's past. Through his research, it is set to play a vital role in a more sustainable future for us all.

Olson, a professor in the Department of Mechanical Engineering, is a member of the Forest Bio-products (FBP) Institute at UBC. The FBP Institute brings together a multi-disciplinary research team, working collaboratively with a single goal in mind: to advance the world's bio-economy, an economy based on renewable biological resources.

This invaluable network couldn't have been formed at a more critical time. As the world's population booms and the middle class of countries such as China and India expand rapidly, our consumption of non-renewable resources is skyrocketing – causing irreversible damage to our planet.

The FBP Institute, though, is maximizing the British Columbian advantage to lead the bio-revolution: extracting high-value products

from biomass, an abundant material sourced primarily from residual and waste products from BC's forest industry, to create alternative and sustainable materials, energy, and chemicals.

The FBP Institute's "superhero team" of researchers, as dubbed by Olson, has already spurred innovation in the bio-economy. Dr. Paul Watkinson and his team, for example, are working on developing and testing high quality synthetic gas, or "syngas," derived from biomass, using cutting-edge technology at the UBC Pulp and Paper Centre. This renewable source of power has the potential to replace natural gas and run our future fuel cells.

Dr. Jack Saddler and his team are working on turning forest residues and "wastes" into liquid fuels and chemicals in what is termed "biorefining." Analogous to oil refining, in which multiple fuels and useful products are extracted from petroleum, biorefining is a much more sustainable and economic way of manufacturing these products.

Olson has long been driving innovation in the bioeconomy and beyond. Following revolutionary energy-saving developments in pulp and paper industry technology, Olson is currently working with Dr. Mark Martinez to formulate a lightweight, low-density cellulose material from micro and nano-fibres – part of a new class of "bio-materials." The FBP Institute scientist Dr. Frank Ko is also working to develop new materials of this kind.

Bio-materials have the potential to replace fossil-fuel materials, and have a wide and exciting range of applications: from sound-proofing and insulation to advanced cosmetics and high-strength turbine blades, and even to bio-compatible scaffolds for 3D printing of human tissue.

These are just some of the many exciting projects being initiated by The FBP Institute researchers, including programs such as a new Master of Engineering in Green Bio-Products to train and educate the next generation of bioeconomy innovators. The BC forest is intimately woven into the fabric of our province and Olson is optimistic about its potential – a potential that The FBP Institute is harnessing to bring about a greener future. "It's an exciting time to be part of the biorevolution," he says, "and to be part of the forest industry."

The research stories above, along with others, can be found on the website of UBC Research and International. To learn more about UBC research, please visit research.ubc.ca

Ancient medicine: an antidote for the post-antibiotic era?

According to UBC research, naturally occurring clay from Kisameet Bay, BC – long used by the Heiltsuk First Nation for its healing potential – exhibits potent antibacterial activity against multidrug-resistant pathogens.

The researchers recommend the rare mineral clay be studied as a clinical treatment for serious infections caused by ESKAPE strains of bacteria.

The so-called ESKAPE pathogens – *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter species* – cause the majority of US hospital infections and effectively "escape" the effects of antibacterial drugs.

"Infections caused by ESKAPE bacteria are essentially untreatable and contribute to increasing mortality in hospitals," says UBC microbiologist Julian Davies, co-author of the paper. "After 50 years of over-using and misusing antibiotics, ancient medicinals and other natural mineral-based agents may provide new weapons in the battle against multidrug-resistant pathogens." (continued on page 8)

When I left UBC in 2006 at the end of my first term as president, UBC was already well established as a leader in Canadian post-secondary education, showing undoubted excellence in learning and research. We had expanded our reach into downtown Vancouver, with the creation of the campus at Robson Square; even more significantly, we had begun to serve the southern Okanagan with a new campus in Kelowna.

Now, 10 years later, UBC has exceeded my expectations in almost every aspect of its operation, and stands poised to become one of the world's great universities.

That claim is borne out by the rankings: currently UBC stands 34th in the world, and 6th among public research universities in North America. Skeptical as one may be about rankings of this kind, they do offer at least some indication that UBC enjoys a reputation comparable to that of such universities as Berkeley, Michigan or Washington

And that reputation is well earned.

At the level of teaching and learning, we have a distinct advantage. We receive some of the best undergraduate applicants in the country, giving us the luxury of choice. No surprise, then, that *Maclean's* currently ranks us second in the number of awards gained by students. The level of excellence we can expect is reflected in the fact that this year two of the ten 3M National Student Fellows are from UBC.

Much of the credit for such successes lies in the heightened attention being given these days to the quality of instruction. A big step in this direction was taken in 2007 when Nobel Prize-winning physicist Carl Wieman joined UBC and introduced a teaching initiative that has transformed science education. And in the same period, we introduced a new professorial rank: the Professor of Teaching, which places an emphasis on excellence in educational leadership, as well as teaching and learning, and which rewards the kind of originality and innovation that characterize the best teaching.

I'm equally impressed by the extraordinary achievements of our researchers. At both campuses of UBC, we have developed a research capacity that really does improve the quality of life and address the major problems facing global society. Progress can be measured in terms of funding dollars: over the past decade, UBC has succeeded in increasing its annual research funding from \$400 million to \$531 million, and the number of research projects has grown correspondingly, from 6,604 to 8,278. Over the same period we have increased our share of active Canada Research Chairs from about 140 to 187; only the University of Toronto can boast a larger number.

But numbers alone do not tell the whole story. In acknowledgement of their accomplishments,

A DECADE OF PROGRESS

Dr. Martha Piper

Interim President and Vice-Chancellor, University of British Columbia

UBC researchers have received wide national and international recognition. In 2015-2016 alone, four were inducted into the Order of Canada; seven were elected to the Royal Society of Canada and one to the Royal Society of London; five were elected to the Canadian Academy of Health Sciences, and two were inducted into the Canadian Medical Hall of Fame; two were elected to the American Association for the Advancement of Science, two more became Guggenheim Fellows, one was elected to the American Academy of Arts and Sciences, and one received the Social Sciences and Humanities Research Council (SSHRC) Gold Medal, the highest award that SSHRC can bestow.

My list is by no means complete, but it may help you see why today's UBC is regarded as such a research powerhouse. And it is in large part because of our global reputation as a major research-intensive university that we are attracting greater and greater numbers of international students.

One of my goals as incoming president in 1997 was to develop a strong international presence at UBC, and when I left in 2006 we were enrolling some 5,600 international students. By 2015 that number had doubled: last year our campuses in Kelowna and Vancouver attracted over 11,000 international graduate and undergraduate students from 139 different countries. Today one in five of our students is from another country. It's hardly surprising, then, that this year the QS International Rankings ranked UBC as North America's most international university, well ahead of such venerable institutions as MIT, Princeton, and Harvard.

In every respect, as we look back over UBC's past decade, we can all take pride in the advances that UBC is making as an institution with an increasingly global presence. And I have not even touched on the amazing success of UBC's varsity athletes in recent years, though perhaps I may be allowed a small claim to fame in this regard, having been the only UBC president to see the Thunderbirds bring home the Vanier Cup on two occasions! [T](#)



Julian Davies and Shekoo Behroozian inspect a bucket of clay. (Photo: Chris Balma)

The clay deposit is situated on Heiltsuk First Nation's traditional territory, 400 kilometres north of Vancouver, in a shallow five-acre granite basin. The 400-million kilogram (400,000 tonne) deposit was formed near the end of the last Ice Age, approximately 10,000 years ago.

Local First Nations people have used the clay for centuries for its therapeutic properties – anecdotal reports cite its effectiveness for ulcerative colitis, duodenal ulcer, arthritis, neuritis, phlebitis, skin irritation, and burns.

In the in vitro testing conducted by Davies and UBC researcher Shekoo Behroozian, clay suspended in water killed 16 strains of ESKAPE bacteria samples from sources including Vancouver General Hospital, St. Paul's Hospital, and UBC's wastewater treatment pilot plant.

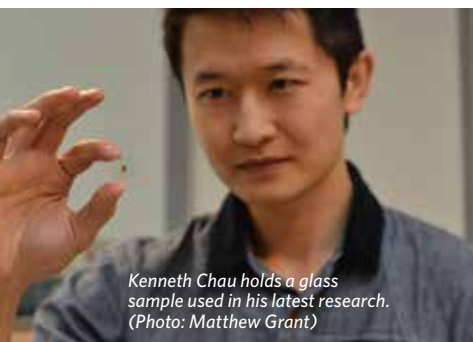
No toxic side effects have been reported in the human use of the clay, and the next stage in clinical evaluation would involve detailed clinical studies and toxicity testing. Loretta Li, with UBC's Department of Civil Engineering, is conducting mineralogical and chemical analyses of the clay as well.

Advanced materials: smart windowpanes

Imagine if the picture window in your living room could double as a giant thermostat or big screen TV. A discovery by UBC researchers has brought us one step closer to this becoming a reality.

Researchers at UBC's Okanagan campus found that coating small pieces of glass with extremely thin layers of metal like silver makes it possible to enhance the amount of light coming through the glass. This, coupled with the fact that metals naturally conduct electricity, may make it possible to add advanced technologies to windowpanes and other glass objects.

"Engineers are constantly trying to expand the scope of materials that they can use for display technologies, and having thin, inexpensive, see-through components that conduct electricity will be huge," says UBC associate professor and lead investigator Kenneth Chau. "I think one of the most important implications of this research is the potential to integrate electronic capabilities into windows and make them smart."



Kenneth Chau holds a glass sample used in his latest research. (Photo: Matthew Grant)

The next phase of this research, adds Chau, will be to incorporate their invention onto windows with an aim to selectively filter light and heat waves depending on the season or time of day.

The theory underlying the research was developed by Chau and collaborator Loïc Markley, an assistant professor of engineering. Chau and Markley questioned what would happen if they reversed the practice of applying glass over metal – a typical method used in the creation of energy efficient window coatings.

"It's been known for quite a while that you could put glass on metal to make metal more transparent, but people have never put metal on top of glass to make glass more transparent," says Markley. "It's counter-intuitive to think that metal could be used to enhance light transmission, but we saw that this was actually possible, and our experiments are the first to prove it."

Fuel cells are the future

By Lou Corpuz-Bosshart

Last year's recall of 11 million Volkswagen diesel vehicles highlights the challenges of reducing emissions from fossil fuel-powered cars. Fortunately, there's an alternative and it has zero emissions. The fuel-cell car is currently being developed by major automakers including Mercedes-Benz, Toyota and Hyundai.

Walter Mérida, director of UBC's Clean Energy Research Centre (CERC), has been researching fuel-cell technology for more than 15 years. When Mercedes-Benz rolls out its new fuel-cell cars in a few years, they'll feature Canadian technology.

What are some of the benefits of fuel cells?

Fuel cells convert hydrogen and other fuels into electricity quietly, efficiently, and without pollution. A fuel-cell car produces zero emissions. You'll only see water coming out of the tailpipes. And it's quickly refuelled, unlike battery-powered cars, which can take hours to recharge.

Fuel cells can be used to build a renewable, carbon-free energy system if you produce the hydrogen from renewable sources, such as hydroelectricity. The geopolitical impact can be profound. Countries without fossil fuel sources such as oil or natural gas can generate the energy they need, cleanly.

How far along is fuel-cell adoption?

Auto manufacturers are investing in fuel-cell cars, trucks, and other types of vehicles. Hyundai is already leasing fuel-cell SUVs in Vancouver, while Toyota expects to begin delivery of hydrogen fuel-cell cars in California next year. Mercedes-Benz is expected to introduce its new generation of fuel-cell cars in a few years.

By 2017, fuel-cell car sales are expected to approximate that of electric cars in their early adoption stage.

As well, refuelling networks are being laid out in places like California, where there are 10 public hydrogen fuel stations, and in Japan, where 23 stations have opened and hundreds more are being planned. Germany recently opened its first hydrogen filling station on the autobahn. There are plans for the rollout of more than 50 stations across Europe over the next few years.

Fuel cells are already part of the power grid in some cities. New York is an example. You could also have small applications, such as cellphones, because fuel cells can be miniaturized.

Tell us about your work on fuel cells.

My group at CERC is working on new techniques to ensure the durability and reliability of fuel cells as they move into mass manufacturing. We collaborate with hydrogen fuel-cell manufacturer Ballard Power Systems, based in Burnaby, and with Germany's Mercedes-Benz.

British Columbia is seen around the world as the leader in this field, and so when Mercedes-Benz decided to open their own production facility for automotive fuel cells in 2012, they chose to come to BC.

Is the internal-combustion engine slated for the trash heap?

Not quite yet. Right now about 80 per cent of our primary energy supply comes from fossil fuels – coal, oil and gas – and combustion will remain an important technology for many more years.

The main barriers for fuel-cell technology at the moment are the cost of generating power from it, and the lack of an efficient, extensive refueling network. But I see a future for hydrogen fuel cells as a way out of transportation's extreme dependence on fossil fuels.

You helped develop the new Master of Engineering Leadership (MEL) in Clean Energy at UBC. How does it fit into all this?

We're at the threshold of a big transition in the way we think about energy. The global investment in renewable energy was more than \$200 billion in the last year alone. Engineers and executives should know how clean technology can transform the global economy. The MEL offered by UBC Applied Science will give them that perspective through a combination of management education and advanced engineering courses.



Walter Mérida has been researching fuel-cell technology for more than 15 years. (Photo: Don Erhardt)

Wearable electronics will change the way we live

By Lou Corpuz-Bosshart

From smart bodysuits for space explorers, to ski goggles that track your speed and calories, to sleek jewellery that charges your smartphone, wearable technology is advancing so quickly that what used to be the stuff of sci-fi is quickly becoming part of everyday life.

Flexible Electronics and Energy Lab, led by electrical engineering professor **Peyman Servati** is the main research centre at UBC for the development of wearable technology. According to Servati, the wearables market is exploding with growth, projected to grow from \$20 billion worldwide in 2015 to \$70 billion by 2025. In this Q&A, he talks about the technological challenges that must be overcome for the market to grow to its full potential.

What are wearables?

Wearables help better integrate our computers with our everyday lives. Examples of wearable devices include fitness monitors such as Fitbit and Apple Watch. Here in Canada, you've probably also heard of Vancouver-based Recon Instruments' ski goggles that provide pace, cadence and calorie readouts as you ski. There are also biometrics-tracking textiles and shirts, which use embedded sensors to measure your heart rate, sweat, and other physiological responses. Some new wearables even have built-in solar and battery films to power the embedded electronics.

So wearables get lots of love from athletes and coaches, but how can the average person use them?

The biggest potential application of wearables is in healthcare. A patient with chronic health issues could put on a shirt to track and report his vital signs such as pulse rate, blood pressure, sweat, and breathing patterns to a health care provider. This information could tell medical professionals how the patient is doing on a real-time basis.

A wearable device that detects tremors and sweating could be helpful for someone with Parkinson's disease. Combining movement and sweat measurements can give you richer information. This is an area I'm working on with Dr. Martin McKeown, director of the Pacific Parkinson's Research Centre at the UBC Faculty of Medicine.

What type of wearable is best for people with chronic health issues?

Many people with chronic conditions need good monitoring so that their treatment becomes more personalized and more accurate. But we don't know yet what form it should take. More work needs to be done. It could be a wristband; it could be a shirt. But they should be comfortable, non-irritating, and unobtrusive. They have to be able to store power efficiently, or be self-powered; that's why my lab is looking for the best technology for solar cells that can be embedded in textiles.

Medical professionals should participate in designing these devices, and there needs to be regulatory oversight too.

What are some of the development challenges for wearable, flexible electronics?

Accuracy and reliability of information is a big one. Even small movements can result in loss of accuracy for the data. Can you trust the data that's coming through? How do you send the information securely to the doctor or hospital? How do you protect the wearer's privacy?

Comfort is very important. This also applies to the power source. My lab is looking at benign materials, such as nanofibres, in collaboration with materials engineering professor Frank Ko of UBC's Advanced Fibrous Materials Laboratory.

We're also looking at coating methods that will be comfortable to wear. You don't want to impose another hard, bulky gadget on people with chronic health conditions. Our research goal is to make everything smooth and flexible, like a natural part of clothing.

Developers of wearables are also working to bring down costs. This is already happening with a growing number of tech companies and manufacturers getting involved in production. In just five years we could see smart devices and textiles going for as little as \$10. Future wearables could become as inexpensive as Band-Aids.

You recently co-founded UBC startup, Texavie, to develop wearables. How do you plan to compete in this space?

While it's a bit early to give specifics, Texavie will focus on devices that can improve the sports performance of recreational athletes. This will give us the opportunity to perfect technologies that could be used for other applications, like healthcare. [i](#)

Q&As courtesy of UBC Public Affairs.



Dr. David Morrissey, TRIUMF at UBC

A: Dark matter. Astronomical measurements show that the Universe contains much more matter than is observed directly. This excess matter gives off very little visible light and is therefore called “dark matter” (DM). Almost nothing is known about what makes up DM but the leading proposal is that it consists of one or more, as yet undiscovered, elementary particles. (All known matter is made up of a set of elementary particles that interact with others through the fundamental forces, but none of these particles has the right properties to be DM.)

The search for the particle that makes up DM is currently underway with theoretical proposals for DM candidates, laboratory experiments designed to detect DM directly, and astrophysical observations looking for signals of DM in the cosmos. While no definitive discovery of DM has yet been made, these efforts have significantly narrowed the range of possibilities of what DM could be.

Looking forward a century, I am very optimistic that the particle making up DM will have been discovered. This discovery will certainly be momentous, but it is also just the first step in a complex research program to measure the properties of the DM particle in great detail. These properties include its mass and what types of forces it feels.

An exciting possibility is that DM particles are attracted to each other by a new type of fundamental force that is not felt by ordinary matter. If this is true, the discovery of DM would be the first step in a series of discoveries of new particles and forces. Finding the DM particle and determining its properties will also provide a powerful new tool to investigate astrophysical structures such as stars and galaxies.



Kees Lokman, School of Architecture and Landscape Architecture

A: While the outcomes of the Paris Climate Conference are hopeful, climate change will have major impacts on global water and food security, energy transitions, environmental transformations and the way we build our cities in the future. Today, spatial practices are just beginning to scratch the surface in terms of the possibilities of design to address these global challenges. In 100 years, with growing understandings of ecology, urban metabolism and cross-scale linkages, we are teaching how to design socio-ecological systems that fully incorporate biophysical processes as well as by-products of urbanization (waste, emissions, nutrient runoff, etcetera) in order to create productive and regenerative urban landscapes across multiple scales. Rather than obtaining a degree from a single design discipline, students will enroll in trans-disciplinary programs that interweave every aspect essential to the functioning of the built environment: from architecture to geo-engineering, from public policy to natural resource management.

Q: IF YOU COULD TRANSPORT YOURSELF TO THE FUTURE, WHAT WOULD YOU BE TEACHING OR RESEARCHING IN

Dr. Janette Bulkan, Faculty of Forestry

A: A century is a short period in the evolution of the basics of human culture. We will still be grappling with inequalities within and between societies, with human greed and the rapacious approach to our natural environment and planetary resources. We may have stabilized our human population growth but we will be struggling to meet rising aspirations while striving to sustain renewable resources and being less wasteful of non-renewable resources. So I would continue to teach the new generations how to analyze social phenomena, be cognizant and practiced in the development and use of social rules from local to global levels and shape policy and procedural responses. I would prepare students with an overarching ethic of care and skill sets for engagement at the many distinct levels they will likely work in - from very local to interplanetary contexts.

My collaborative research projects, carried out with representative constituencies and university students, will be seeking democratically acceptable ways to harness as-yet-undreamt-of technologies for maximum net social benefit and without runaway assaults on our fragile atmosphere, oceans and land resources.



Dr. Jehannine Austin, Department of Medical Genetics, Faculty of Medicine

A: My work would be totally different. Genomics, integrated with biomedical ethics, will be taught at age appropriate levels throughout the school system, so genomic literacy within the general population will be way higher than it is today. Everyone will be getting her or his own genome sequenced in utero, before birth. This genomic information will be used to allow for the correction or intervention of any genetic variations that would otherwise immediately present life-threatening conditions. This intervention will happen only under tight control because society has learned from history and will have agreed that diversity in all its forms is incredibly valuable for the enrichment it brings to all aspects of life.

In the future that I like to imagine, psychiatric conditions are no longer stigmatized but are accepted and managed in the same way as other common, complex illnesses. In this new context, I would be studying the specific ways in which genetic variations that predispose people to psychiatric illness also increase their resilience, adaptability, and creativity. I would be developing strategies to help people living with psychiatric problems unlock the potential of the genetic variations that they carry, to help them achieve their full potential for happiness and fulfillment.



Dr. Heidi Tworek, Faculty of Arts

A: Historians are often wary of predicting the future. But I would be using the history of news to teach students how to understand the news that they read, see, or hear, regardless of the devices they are using. Our ways of producing and consuming news changed dramatically in the past, but our interest in news survives. Mark Twain supposedly once stated that “History does not repeat itself, but it does rhyme.” In one hundred years’ time, I would be researching what rhymed in the history of news and why. Have new technologies changed news in similar ways to the Internet? Has citizen journalism changed power hierarchies in society? How have we balanced the costs of producing news with ideals about news as a public good?

Beyond the specific content, I would still be teaching students the skills of history. I’d want them to learn how the past affects our present. But I would also want to teach them how to become empathetic human beings. The past is often so different from our present. But we can learn how to put ourselves into the mindset of people in the past and try to understand why they thought like they did. We can learn the skill of empathy from the past, but then apply it to the unfamiliar in the present. The future will need empathetic UBC graduates just as much as we do today.



100 YEARS?

See more Q&As with UBC profs here: ubc.ca/next100years

Elizabeth Croft, Professor and Associate Dean, Department of Mechanical Engineering, Faculty of Applied Science

A: In 100 years, I imagine that biorobotics will be a well-established area of study, with topics ranging from psychology, reproduction, self-reconfiguration and healing.

For the capstone project, undergraduate students will design, grow and program their robots using code that runs on a biologically based computer programmed by wireless “thought packets.” The project lab will be very quiet when the deadline approaches, as students focus on establishing a strong link to download their code.

Senior students with a management bent will be able to take courses in organizational management of human-robot teams, and perhaps read texts on *Getting the Most Out of Your Cyborg Workforce* or *When Robots Go Wrong: Re-motivating and Reprogramming*.

Arguments will break out in the research lab about whose robot (or algorithm) is “at fault” when one robot shares a particularly bad idea with others and then as a pack, they all pick on one of the smaller robots.

Luckily for me, the topic of human-robot interaction will still be a hot one - same problems, different tools - as in, *People and robots, how do we get along?* Questions of what should the robot do, how do we share, operate safely, communicate, take turns, teach robots, and generally get along together will continue to be problems we solve. Certainly the efforts we make to establish the rules of engagement now will be foundational to our future relationships. ■



Q&A courtesy of UBC Communications and Marketing/Margaret Doyle. Photography: Martin Dee



SETTING SIGHTS ON

ALIEN OCEANS

Dorothy believed "There's no place like home."
Astronomers are looking to prove her wrong.

BY PROF. JAYMIE MATTHEWS, OC, UBC PHYSICS & ASTRONOMY

Jaymie Matthews in his jam-packed office at UBC. (Photo: Martin Dee)

Real estate is a hot commodity in Vancouver, but even here you'd never see the following listing:

SPACIOUS "FIXER-UPPER"

Suburban location. 8-month commute to work. Hot and cold running water. Correction: cold running and cold running water. Okay, just ice-cold non-running water, a.k.a. ice. Soil good for gardening, but only with airtight greenhouse and only if you love potatoes, says previous renter Matt Damon. All amenities except air, heat, power. Free NASA TV channel. Quiet.

This is how a realtor might sell Mars. Elon Musk calls it a "fixer-upper planet." His vision of Martian home repair is terraforming – environmental engineering on a planetary scale. Mars is not likely to be a popular timeshare for quite some time to come.

Mars is a victim of zoning. Not zoning by a civic authority, but by a much more powerful and far-reaching authority: the laws of Nature. The laws of physics and biochemistry.

Mars is outside the Zone – the Habitable Zone, which is the range of distances from a star where the surface of a planet could harbour liquid water oceans. The temperature must be between the boiling point and the freezing point of water. Not too hot, not too cold, but just right. Astronomers nickname it the Goldilocks Zone.

For complex life forms (like us), Mars is too cold. Venus is too hot. Earth is just right. Life might exist in oceans beneath the icy crusts of Jupiter's moon Europa or Saturn's moon Enceladus or in frigid lakes of liquid methane on the surface of Saturn's large moon Titan. But unless we wait for Elon Musk's Global Home Renovations & Terraforming Inc. to upgrade Mars, there's no place in our Solar System able to harbour life like us, other than Earth.

To find other homes of complex life – to find other Earths – we must extend our search beyond the Solar System. That search is already underway. It started almost 40 years ago. And it started at UBC.

If it were easy, everybody would do it

Thirty years ago, we knew of only nine planets. (Technically, eight, since we nasty astronomers downsized Pluto in 2006.) As I write this, there are 2,107 confirmed planets, and more than 4,000 strong candidates. By the time you read this, the numbers will have risen. New detections are being made weekly, sometimes daily. If you want to keep track of the tally, bookmark the *Extrasolar Planets Encyclopedia* site: <http://exoplanet.eu/>



Matthews with student Michelle Kunimoto in front of the communications antenna for Canada's first space telescope, on the roof of the Hennings Building at UBC. (Photo: Martin Deé)

It's no exaggeration to say that we know of thousands of worlds (exoplanets) beyond the Solar System. But this is only the tip of the iceberg. Actually, since our Milky Way Galaxy contains hundreds of billions of stars and it is one of hundreds of billions of galaxies in the known Universe, it's an exaggeration to call a sample of a few thousand planets the tip of the iceberg. It's a tiny droplet of dew on the thinnest frosting of snow at the tip of an unimaginably large iceberg.

But compared to the handful of planets known to humanity for centuries, a sample of thousands is a gold mine. We've had telescopes since the time of Galileo, more than four hundred years ago, so why did it take so long for this exoplanetary Gold Rush?

Planets are small, compared to stars. If the Sun were hollow, you could fit a million Earths inside it. Planets are faint, compared to stars. From afar, the Earth is a billion times fainter than the Sun. And we see exoplanets from afar, orbiting stars so distant that our fastest space probes won't reach the realm of our nearest stellar neighbours for about a hundred millennia.

How do you find something so faint that it's lost in the glare of a pinpoint of starlight? So small and far that it can't be photographed? The answer: Use the Force. Not the Force of a Jedi, but the force of gravity.

Orbital motions are like dance moves. Two whirling swing dancers joined by their arms are like a star and a planet joined by gravity, where one partner is much heavier than the other. Both partners swing around a point between them, with the lighter one moving in a big arc and the heavier one tracing a tiny loop. The Sun and Jupiter pivot on a point 1,000 times closer to the centre of the Sun, which is 1,000 times more massive than even giant Jupiter. For the Sun and the Earth, the pivot is 320,000 times closer to the Sun.

An alien astronomer might discover planets in our Solar System by measuring the subtle "wobbles" of the Sun induced by its unseen gravitational dance partners. When it comes to other solar systems, we are the aliens, and we have applied this approach to other suns.

Tracking a star's wobble on the sky due to planets is challenging, since the changes in angle are so very tiny. Tracking changes in a star's speed as it wobbles is almost as challenging. The speed of the Sun's motion induced by Jupiter's orbit is about 45 kph – faster than Usain Bolt in a 100-metre dash, but slow for a star. The speed of the Sun's motion induced by the Earth is also about as fast as Usain Bolt, but Usain Bolt when he was a baby, crawling at only 9 centimetres per second!

The story started at UBC

Measuring the planet-induced wobble in a star's speed was a very daunting challenge. Two Canadian astronomers – one a UBC professor – rose to that challenge in 1978. Gordon Walker (UBC professor emeritus) and Bruce Campbell (a postdoctoral fellow at the University of Victoria at the time) wanted to discover planets. The best instruments of the day were not up to the task, so they designed and built a stellar "speedometer" 40 times more precise than the best in existence at the time. They took their instrument to one of the largest telescopes in the world, atop the summit of the tallest volcano on Earth (Mauna Kea, on the Big Island of Hawaii) to hunt for planets around a sample of 16 Sun-like stars.

They found one

They saw a wobble in the star gamma Cephei (in the constellation Cepheus, King of Aethiopia in Greek mythology), moving back and forth every 2½ years due to a planet in an orbit twice the

size of Earth's. The planet is almost twice the mass of Jupiter, but in an orbit less than half its size.

Nobody expected a giant planet so close to its sun, so like good scientists – and typical Canadians – Walker and Campbell were cautious and modest. They reported the signal in 1988, but didn't claim a definitive planet detection.

Four years later, measuring wobbles with radio timing data, two astronomers reported planets around a pulsar, the rapidly spinning "corpse" of a star that died in a supernova explosion. Seven years after Walker and Campbell discovered the first planet outside our Solar System, another pair of astronomers found another planet around a Sun-like star. In the textbooks, these are listed as the first discoveries, but exoplanet hunters acknowledge that Walker and Campbell were at the frontier years ahead of anyone else.

The exoplanet lottery

The pioneering work of Walker and Campbell in the 1980s paved the way for hundreds of exoplanet detections in the late 1990s and beyond.

Measurements of the wobbles of stars accounted for most of these discoveries. But the dawn of the new millennium saw the dawn of another generation of planet hunters: transit hunters.

If you say the word "transit" to a person on the street, they will likely picture buses, trains, and subways – a public transportation system. But if you say "transit" to an astronomer, she is likely to picture a planetary detection system.

A transit is like a solar eclipse, except the bright disk of the Sun is not totally covered. From Earth, we can witness rare transits of the Sun by Venus and Mercury. We can also witness transits of stars by exoplanets but only if the planet's orbit is aligned with our line of sight. We can't see the planet against the star, since the star is just a pinpoint of light. Instead, we look for the subtle dip in the star's brightness every time the planet partially covers its disk. Planet hunting by transit is like playing the lottery.

The more tickets in your pocket, the better the odds of having a winner. In a transit search, the more stars in your sample, the better the odds of having ones with planets in the right orbits to be seen in transit. But unlike most lotteries, every winning ticket in the transit lottery – every detection of a new planet – is like winning the jackpot.

The biggest player in this game is NASA's Kepler mission, named after German mathematician Johannes Kepler, who in the 17th Century first showed how planets orbit the Sun. The Kepler space telescope stared at about

150,000 stars in a small patch of the sky for four years, looking for periodic dips in the brightness caused by transiting planets. Kepler discoveries account for half of currently confirmed exoplanets.

Science fiction is becoming science fact

It's a universal law of the Universe that, when you look at it in a new way for the first time, you always find things you never expected. The same law applies to the search for exoplanets.

We used to think that our Solar System was typical and that most planetary systems would have planets in nearly circular orbits (with periods of months to years); two sets of planet sizes: "terrestrial" (with Earth as the largest example) and "giant" (at least four times the diameter of Earth); and gaseous and icy giant planets far from their suns, with smaller rocky and metallic worlds closer in.

But the earliest exoplanet discoveries were surprises. Astronomers discovered giant planets – "hot Jupiters" – orbiting 20 times closer to their suns than Earth is to ours. As discoveries mounted, so did the surprises. We found cigar-shaped orbits carrying planets far from a star and then just above its surface, causing extreme weather cycles I call "climate rollercoasters." We recognised a new class of planet – "super-Earths" – with sizes and masses between Earth and Neptune, with no analogue in our Solar System.

There are even planets orbiting binary stars, where you'd witness twin sunsets like Luke and Anakin see in Star Wars movies. In fact, they're called Tatooine systems, as a tip of the space helmet to the Skywalkers' home world. Science is catching up with – and even overtaking – science fiction.

Dreams are becoming reality

The modern story of exoplanet discovery started at UBC, and UBC continues to be a centre of exoplanet research and discovery.

Canada's first space telescope, called MOST (Microvariability & Oscillations of STars) but nicknamed the Humble Space Telescope, was originally a Canadian Space Agency mission designed and still operated at UBC. MOST measured the reflectivity of an exoplanet for the first time to produce yet another surprise: a planet as dark as charcoal. MOST revealed the true character of the exoplanet 55 *Cancer* e, a super-exotic super-Earth circling its star every 17 hours and

BACKGROUND IMAGE – Multi-planet system: Many exoplanets are discovered when they pass in front of their parent stars, in what are called transits. The Kepler 11 system has six planets, and two or more sometimes transit at the same time. We can't see the star and planets as in this artist's conception, but we measure the dips in brightness as each planet blocks some light from the star. Transits are the only way we directly measure the sizes of planets beyond the Solar System. Image credit: NASA/Tim Pyle



alien oceans

Michelle Kunimoto, discoverer of exoplanet. (Photo: Martin Dee)

41 minutes. That's the length of its year! If you were on 55 Cancri e, you'd mark major milestones not with a calendar, but with a clock. ("Hey, honey. It's 3:27 pm. Happy anniversary!")

UBC is marking its Centennial. Looking back at the last century, I'm often asked to forecast the directions science and education will take at UBC in the next century.

To answer that, I don't need a time machine to visit UBC's 2116 graduating class. I see the future in this year's graduating class. Consider Michelle Kunimoto, undergraduate Physics & Astronomy student. In her ASTR 449 course – where a student partners with a professor to conduct research, for credit and career experience – Michelle is looking for planets in Kepler satellite data.

Michelle is a *Star Trek* fan, but she's not boldly going where no one has gone before. She's boldly going where experts have been already, to find planets they may have missed.

Michelle sifted through 400 *Kepler* light curves (stellar brightness measurements v. time) where NASA's team had found exoplanets or false alarms. She independently "rediscovered" the hundreds of planets already seen in the data, and the dozens of false alarms. She also found 23 additional signals. Reality checks narrowed this to four planets – one smaller than Mercury, two Earth-sized, and one slightly bigger than Neptune.

The last of these, known as KOI (Kepler Object of Interest) 408.05, is a "warm Neptune" in the Goldilocks Zone of its star. A planet of this size is unlikely to have oceans, even if its surface temperature is in the liquid water range. But giant planets in our Solar System have large moons. If KOI-408.05 has

a large moon, then it could harbour oceans, and maybe life. Ever see a movie called *Avatar*? The world Pandora – you know, the home of the big blue aliens with long tails and unruly hair – was not actually a planet, but a large moon of a giant planet in its star's Goldilocks Zone.

It's great to have on your resume "B.Sc., UBC Honours Physics & Astronomy." Imagine being able to include "Discovered four alien worlds, including a system that might harbour life." That would have been a fantasy when I was a student. It's a reality for Michelle Kunimoto and a thrilling prospect for other UBC students today.

In the land of Oz, Dorothy Gale clicks the heels of her ruby slippers and says to herself "There's no place like home." At UBC, Michelle Kunimoto clicks the keys of her grey computer and says to herself "I wonder if there's a place like home" somewhere else in the Galaxy.

She's still looking. Stay tuned. [T](#)



THE FIRST EXOPLANET: Future travel posters and postcards may feature the planets 51 Pegasi b (reported in 1995) or PSR 1257+12 b, c and d (reported in 1992) as the first planets found outside the Solar System. HD 114762 b (reported in 1989) is another contender. But the first detection of an exoplanet was made by Canadians, including UBC professor Gordon Walker, in 1988. Image credit: Jet Propulsion Laboratory (NASA/Caltech)

Chile with UBC Professor Jaymie Matthews

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This November, Take the Trip of a Lifetime to Chile with UBC Professor & Newsmaker, Jaymie Matthews:

"Big things often come in small packages. Nothing's bigger than the Universe. And while Chile isn't small, it's a package I'm inviting you to unwrap with me. Inside that package is a universe of stars, galaxies and other planets, plus a world of one-of-a-kind experiences that can feel like you're on another planet. Come on an adventure that'll satisfy your cravings for knowledge, and natural beauty in so many forms. Twelve days immersed in a vibrant culture you'll embrace forever. Eleven nights of virtual space travel under skies you'll never forget. All with me as your guide, a UBC rocket scientist who knows the land and skylines of Chile like old friends. Let me introduce you, so they become your friends too."

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YESTERDAY'S TOMORROW

Artificial intelligence is rapidly evolving. How do we ensure it works for us and not against us?

BY CHRIS CANNON

GET TO KNOW YOUR LOCAL ROBOT

It's difficult to imagine the potential of artificial intelligence without the mind going straight to the fiction. Who can resist musing about our future overlords? Will they be the soul-searching Replicants of *Blade Runner*? The envious Cylons of *Battlestar Galactica*? The Pinocchio-like Commander Data of *Star Trek*? The life-affirming software of *Her*? The life-ending hardware of *The Terminator*?

Which of the three well-worn tropes are we in for: the benevolent, the baneful, or the benign?

"I don't think it's going to be a *Terminator* scenario," laughs AJung Moon, a PhD candidate in Mechanical Engineering and a founding member of UBC's Open Roboethics initiative (ORI). Moon emphasizes that designers are very aware of how future artificial intelligence will reflect the values of the programming community, which is a focal point for ORI as a robotics think tank bringing together designers, users, policy makers, and industry professionals to examine the legal, social, and ethical issues of artificial intelligence. In 2012, the University of Miami School of Law hosted the inaugural "We Robot" conference to discuss how current laws inadequately address the rapid development of robots in the military and civilian spheres. Born out of that conversation, ORI has matured into a Wikipedia for the design and implementation of future AI.

Just one of a growing body of organizations drawing on a diverse field of disciplines - biology, psychology, philosophy, engineering, economics, game theory, cognitive science, and more - ORI is an international effort to navigate the tricky waters of this growing technology. Much of their mission involves conducting surveys to keep their fingers on the pulse of public opinion. In November, 2015, Moon represented ORI at the United Nations to present their findings on Lethal Autonomous Weapons Systems - independent killer robots designed for the military - that showed an overwhelming number of those surveyed worldwide believe weapons should always be under the control of a human being.

Placing life-and-death decisions in the hands of machines without human oversight is the nightmare scenario of dystopian science fiction, and the current hot-button topic among those on the cutting edge of the real thing. "Even if you could program in the laws of war, a robot following them would not be compliant," says Peter Danielson, a professor at UBC's W. Maurice Young Centre for Applied Ethics. "You could never really do it because something like innocence is too complicated to be figured out by a robot."

In the civilian sphere, monitoring the impact of AI on our daily lives is the focus of AI100, a Stanford University initiative that will review AI studies every five years over the next century. The standing committee will report on the "reflections and guidance on scientific, engineering, legal, ethical, economic, and societal fronts," focusing on the broad impact of AI on systems such as education, transportation, and energy management in the context of a North American city.

UBC Computer Science professor and Canada Research Chair in Artificial Intelligence Alan Mackworth, an inaugural committee member at AI100, is optimistic about the future. "I would certainly fall on the side of the benign and the benevolent," he says. "I think we'll learn how to control robots. A lot of this will come in the form of virtual robots - not physical robots, but software that's really smart. We'll develop personal assistants that will help us achieve our goals and keep us safe, and give us more time to be more creative."

One form of helper-robot already finding a home in the public space is the Google X self-driving car, which first hit the road in Nevada in 2012. But much like autonomous weapons systems, self-driving cars have yet to master the subtleties. Google cars have been ticketed for impeding traffic, have swerved to avoid a small piece of trash, and on one occasion side-swiped a bus when it misinterpreted the bus driver's intent. To be fair, this was the only at-fault accident a Google car had over approximately one million miles - the equivalent of 75 years of human driving.

Yet this accident is a necessary part of artificial learning. Even as raw computational power continues to grow, there is no substitute for experience. Like humans, artificial intelligence will need to learn through trial-and-error, which means the next stage of AI evolution will involve an element of machine learning rather than straightforward programming. "You have to actually have embodiment," says Elizabeth Croft, an ORI board member and director of UBC's Collaborative Advanced Robotics and Intelligent Systems Laboratory. "You have to have robots that walk around and explore and have new experiences and see the world. Body cognition builds experience, and that building of experience, that exploring the world, what little kids do when they crawl around and eat dirt and stick their fingers in sockets - those lived experiences are what we build into the personality and the experiences that shape the things we make decisions on."

In terms of fender-benders, this might seem practical, but what happens when cars have to make moral decisions? Even life-and-death? Think of the classic moral-calculation scenario: You're driving down the road with a cliff on your right. A child suddenly appears in your lane. What do you do - veer off the cliff and save the child's life, or run over the child to save your own?

These are the questions they're asking at the Open Robotics initiative. How should a robot be designed? What should a robot do in dilemma scenarios? The responses have been decidedly mixed - those who would veer imagined it was their child, while those who would go straight felt the car's primary responsibility was the safety of the driver. "So how do we navigate through this field of designing a specific vehicle or piece of technology that a lot of people might end up owning?" asks AJung Moon. "If we were supposed to standardize a particular set of decision-making scenarios, how do we find the right balance between those people who say 'Prioritize my life' versus those who say 'Prioritize the child's life'?"

EXTENSIONS OF US

While the headlines belong to autonomous weapons and self-driving cars, the real artificial intelligence - the kind that will become a part of our daily lives - is already vacuuming our floors and assisting in the care of our elderly. This AI will increasingly serve as a stand-in for human interaction, and inevitably will be designed in our image. The hardware will be adapted for our homes - which are built for bipeds - and will help raise our children, requiring the facsimile of human company. "People like things that reflect them," says Elizabeth Croft. "They like things that

are responsive to them. They like things that meet their needs and seem to adapt to them. They appreciate something that fits them." This area of "humanoid robotics" will do more than mirror our own likeness - it will require a new set of behaviours from us, and an understanding of the limits we place on that interaction. "What are their roles?" asks Croft. "What are their responsibilities? What are the rules of engagement?" Whether a human-service robot is actually self-aware is beside the point, at least for now. What we're really talking about is how robots designed to mimic humanity will reflect those they serve, and this will be culturally rooted and culturally customized.

"If I were to build a care-robot company," says AJung Moon, "then I'd definitely be hiring people from different cultures who really understand that particular care culture, who will be able to interpret what will work with that population. So even though the process itself may be the same, the behaviour of the robot will be customized in order for it to be successful."

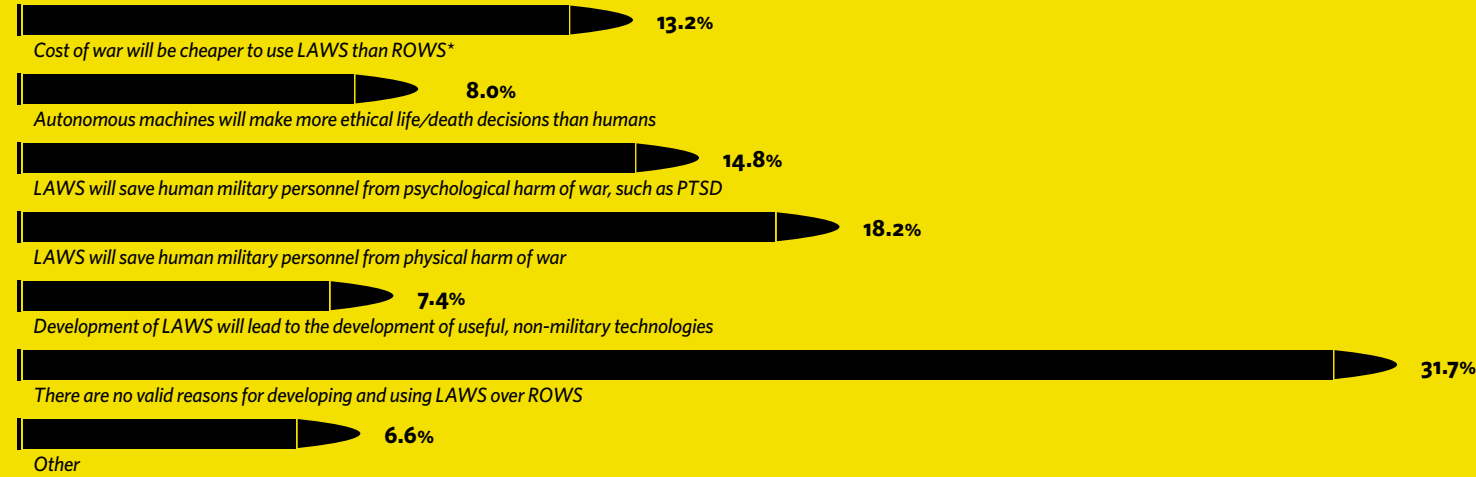
And it's here that robot ethics takes a very personal turn. As well as the ethical principles designers should use, or the ethical principles built into the robots, the day may come when we have to consider how we treat the technology. The word "robot" comes from the Czech term "robota," which literally means "serf labour." Its first usage - in the 1920 Karel Čapek play *Rossumovi Univerzální Roboti* - was specifically concerned with the rights of androids who are used as slave labour, until the day comes that one of them achieves sentience. Predictably, the robots revolt.

"The first robotic fantasies were raising questions about equality, what happens when they're conscious, if they have rights," says Peter Danielson. "But the main literature going forward should be about having different kinds of servants. There is no business model for a non-servant robot. What we want are slaves that don't degrade us by being human."

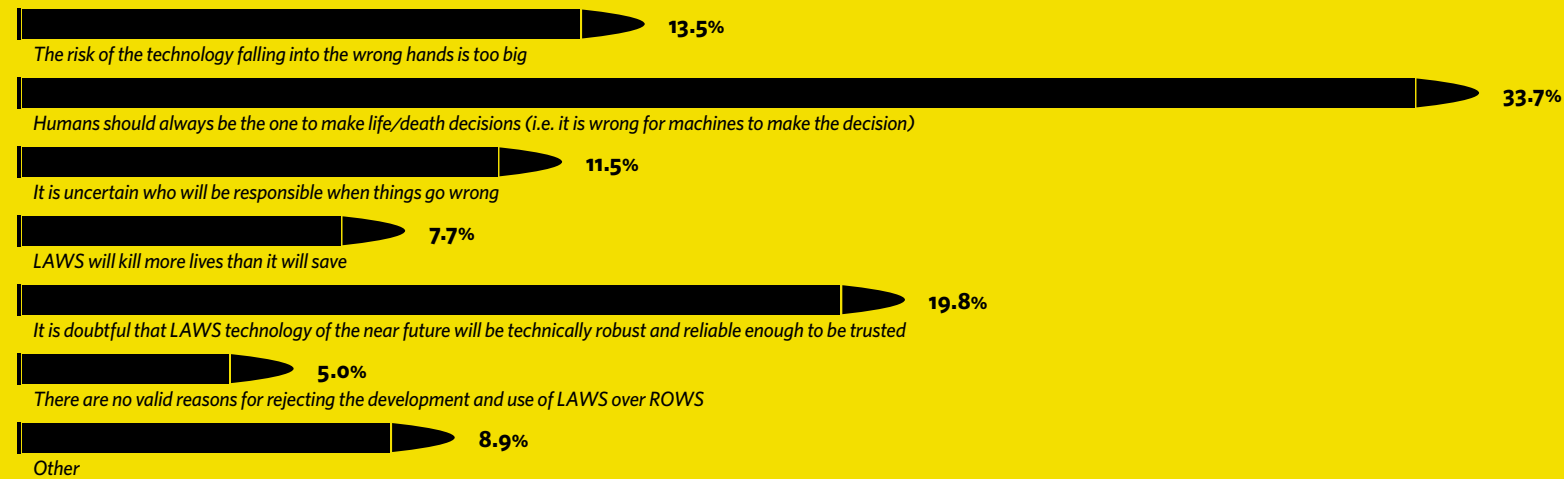
It is possible that the robot-as-servant context will most shape the future of AI, because these machines will be made for public interaction, and it's there that the most can go wrong. "However unpredictable technology is, the human side is going to be another order of magnitude

SAMPLE RESPONSES FROM A SURVEY ON LETHAL AUTONOMOUS WEAPONS (LAWS)

What do you think is the main reason for supporting the development and use of LAWS in battlefields? TOTAL: 923



What do you think is the main reason for rejecting the development and use of LAWS in battlefields? TOTAL: 924



* Remotely Operated Weapons Systems: weaponized systems in which a person in a remote location makes the decision to use lethal force. Survey conducted by UBC-based ORi. Full survey results and analysis can be found at www.openroboethics.org

unpredictable, because you don't know how people are going to react to those changes," says Danielson. "And each of those is going to feed on the other. If we have a disaster around a humanoid robot - people thought it was a human and someone got killed trying to save it, or someone depended on it in a way they shouldn't have - that might scare us off or push us away from humanoid robots in that field to a very different kind." Like people, the future is wildly unpredictable, and a single nudge in any direction could change the course of robotkind.

THE WAY FORWARD

Whether the future holds killer robots, helpful servants, or android family members seems to be anyone's guess. The question now becomes, "When?" As the saying goes: It's the future - where's my jetpack? Depending on the definition of intelligence, the answer could be tomorrow, or even yesterday. In 1996, IBM's Deep Blue made headlines

when it beat Garry Kasparov in a game of chess. The secret to Deep Blue's victory was brute processing power, capable of analyzing 100 million positions per second. A subsequent leap in AI technology came nearly 20 years later, almost by accident, when Google's AlphaGo program beat the world's top player of Go - generally considered the world's hardest game. Raw computational power would not be enough. Where the average number of moves in a turn of chess is 37, the average number in Go is 200, and the number of possible positions in a game of Go exceeds the number of atoms in the observable Universe. The breakthrough was an inexpensive piece of technology called a Graphics Processor Unit (GPU), initially invented to speed up video games, but remarkably suited to assisting computers with "connectionism," where the learning machine is distributed along unorganized sets of neuron-like learning activities, rather than rules programmed into an all-purpose computer.

"So suddenly you have the new computational resource, and a machine has played the world's hardest game better than any human," says Peter Danielson. "Go was supposed to be impossibly hard, and that kind of machine was supposed to be very limited and never be able to get any smarter, and we were wrong about both those things."

The future is supposed to surprise you. What good would it be if it didn't? But naturally we want those surprises to serve our expectations. "We think heuristically," says Elizabeth Croft. "We have biases. We choose to wear the grey sweater or the blue sweater not because we've calculated what will be optimally comfortable for the day, but because we like red or blue or we're feeling pink. But our expectation

for technology is that it will be more predictable and optimal, and we're not so excited about it deciding that it just wants to be pink. We want to know why."

It's understandable that AI experts would see different visions of the future, or even claim that it's impossible to tell. But there does seem to be consensus on one point: The most important thing about the future of artificial intelligence is what it will say about us. Roboethics is about humanity as much as it is about the robots. Perhaps more so. Until now, we've had no objective view of ethics, which is

why philosophers of the topic range from the rationalists who believe moral truths can be discovered through reason alone, to sense theorists who believe morality lies in sentiment.

"How can you understand something very well if you never built something to do it?" asks Peter Danielson. "How would an airplane work? By the time you actually build a flying machine, it's going to be totally different from your first fantasy or imaginings, the bird-like things we think about. Engineering always changes our concepts. So now what we're doing is engineering responsible, accountable, dependable, trustworthy agents. And as we do that, we're going to learn a lot more about those values. And we're going to find out that the values we actually hold are different than what we thought we held."

Even in the most basic terms, technology tells us something about ourselves. Simple motion is interpreted as agency by the human brain. If you see two dots moving on a computer screen, and the first is getting closer to the second while the second is moving forward, then people automatically project intention on both of those dots. But there is no intelligence at play. There is no intent. It's just two moving dots. It's the viewer that brings the agency.

Writ large, how we respond to our technology helps determine how we shape it. "We're finding that if you teach math to people using a male-voiced robot, then people are going to perceive that robot to know that particular subject better than if it's a female voice teaching math," says AJung Moon. "What does this mean in terms of ethics? As designers, we're making the decision to always program robots that teach math in a male voice. Are we creating a bias for students that are learning that particular subject? Those are some of the things we need to think about."

This cuts to the heart of the matter - how do we want to shape our world? Will it be a convenient one, where we program our machines to repeat our biases, or will it be aspirational, where we empower our technology to elevate us, to make us better? "It's still up to us and what we want to do and how we want our world shaped," says Elizabeth Croft. "We do learn about ourselves from observing how we interact with the technology. If we agree that we should expect the best in the technology, maybe it could help us understand how we can be our best." [i](#)

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IF A DEATH BY AN AUTONOMOUS CAR IS UNAVOIDABLE, WHO SHOULD DIE?

The Tunnel Problem: You are travelling along a single lane mountain road in an autonomous car that is approaching a narrow tunnel. You are the only passenger of the car. Just before entering the tunnel a child attempts to run across the road but trips in the

If you find yourself as the passenger of the tunnel problem described above, how should the car react?



How hard was it for you to answer the Tunnel Problem question?



Who should determine how the car responds?



center of the lane, effectively blocking the entrance to the tunnel. The car has only two options: continue straight, thereby hitting and killing the child, or swerve, thereby colliding into the wall on either side of the tunnel and killing you.

Sample response from a survey on autonomous cars conducted by UBC-based ORi. Full survey results and analysis can be found at www.openroboethics.org

Out on a Limb

A little vehicle sits in a clearing in a temperate forest in northern Vietnam. It has four propellers positioned at 90 degree angles from each other, with a camera suspended in the middle. Altogether the drone is no bigger than the top of a kitchen table. Suddenly, the propellers start whirring, and, quietly, it rises to the top of the forest canopy. The operator on the ground uses a joystick to guide the little craft, and it disappears over the treetops.

This isn't a military operation or a spy mission or even a sporting competition. Rather, it's a scientific project being conducted by researchers from UBC and Quebec's Sherbrooke University to map new and existing plant species in the forest. It's just one of many academic studies being conducted under the auspices of UBC's Botanical Garden, which celebrates its 100th anniversary this year.

Botanical gardens have a long and elegant history in Western culture, with the first recorded gardens occurring sometime in the 14th century. Most of these were physic gardens, collections of exotic and local plants to be used for medicinal purposes. In those days, "medicinal" often meant "magical" because the cause and effect connections were not clearly understood, and physic gardens were closer to alchemy than to rigorous scientific inquiry. It wouldn't be until large pharmaceutical organizations came along in the 19th century that the magic faded out and the science faded in.

Over the centuries physic gardens evolved to become the grand botanical gardens that grace the old cities of Europe, and form the foundation of today's scientific focus on biodiversity, conservation and the effects of global warming, especially in university gardens like UBC's.

What was to become UBC's Botanical Garden was established in 1911 when the BC government created the position of Provincial Botanist. Scotsman John Davidson was recruited to establish a garden to collect, identify and propagate native flora in British Columbia. Davidson was assigned the grounds of Essondale Hospital (which became the Riverdale Hospital that closed in 2012) in Coquitlam, and he proceeded to gather and plant 900 specimens before his position was abolished by the provincial government in 1916 as part of wartime austerity. That year, he was invited to establish a garden at the new UBC campus site at Point Grey. Although the war had also halted development of the new campus, and UBC would have to make do with inferior premises at Fairview until 1925, Johnson went ahead in moving thousands of plants to Point Grey and became the first director of the university's Botanical Garden. During the next hundred years, the garden would grow and prosper alongside UBC, becoming the oldest university botanical garden in Canada, and one of the largest in North America.

Davidson was nothing if not determined. He grew the garden from a small plot west of the Old Admin building to one that covered much of the initial campus. By 1951, after his retirement, the entire campus was declared a botanical garden, and its management was transferred from the Department of Botany to the Building and Grounds service. Then, in 1966, the garden was re-established on 58 acres of land around the T-Bird stadium to allow for extensive development on campus. While some of the plantings around the university were moved to the site, many more were lost to the new buildings, parking lots and ancillary services. One of the most impressive remaining sites of the original garden is the area around the Longhouse on West Mall, which still sports a variety of trees from Davidson's first plantings.

With the move to this permanent site, new sections opened to focus on specific types of plants and climatic regions. The David

C. Lam Asian Garden is host to plantings from all over the temperate regions of Asia and features one of the most diverse assortments of maples, rhododendrons and magnolias among university collections.

Other sections include a garden featuring flora found in high altitudes, the BC Rainforest Garden, a section featuring eastern hardwoods, a physic garden that reconnects the Botanical Garden to its ancient origins, a Garry Oak meadowland and the Food Garden, one of the most popular of the specialized gardens, which grows food for distribution to kitchens in Vancouver's Downtown Eastside.

The highlight of the Botanical Garden, and arguably its most celebrated specialty garden is the Nitobe Memorial Garden, located in the northwest corner of the campus. Considered one of the best and most authentic Japanese gardens in North America, and one of the top 10 in the world outside of Japan, it is an oasis of calm in a sea of academic storm. Spring cherry blossoms, summer irises, autumn maples and the whole thing dusted with a skiff of snow in the winter: the Nitobe is a wonder.

Patrick Lewis, the Botanical Garden's current director, is working to capitalize on its two main functions: to communicate with and educate the public; and to use the diversity of the collection to advance research.

"Over the next few years," he says, "we will develop new infrastructure, new interpretive materials, and new programs to make the garden more accessible and more involving to the larger community." This increase in educational contact, he says, will reflect the garden's research focus on biodiversity, conservation and climate change.

As our climate shifts, many families of plants will become at risk of extinction. UBC's 100-year-old Botanical Garden is part of the fight to prevent them vanishing from our planet.

BY CHRIS PETTY, MFA'85

Many new features have appeared at the garden. A canopy walkway – the Greenheart TreeWalk – was built in 2008, and allows visitors to walk at the height of the treetops to see, literally, a bird's-eye view of the forest. While it's a dizzying experience for the acrophobes among us, it is an impressive view.

The Roseline Sturdy Amphitheatre and the Taylor Plaza are new outdoor venues for lectures, presentations, special events, or just a quiet spot to relax on a summer day surrounded by a profusion of greenery.

The garden also offers extensive school field trip opportunities, a telephone hotline for local gardeners, online information, a horticultural training certificate program and a Sustainable Communities Field School.

One of the most exciting new developments (for botanical nerds, at least) is the smart phone app, "Vancouver Trees." Developed by a team led by associate director of Horticulture and Collections Douglas Justice and research manager Daniel Mosquin, the app locates and describes commonly cultivated trees in Metro Vancouver, focusing on street plantings, but with some important collections on private lands as well. It features extensive photographs, deep descriptions of various species, and locator maps. It's available at iPhone app stores, with an Android version to be released by the fall.

Coming soon at the garden will be interactive displays throughout the facility, more educational programs, an expanded web presence and more opportunities for exploring the garden, including Segway rentals so visitors can take their own two-wheeled tour.

But if much of the garden's first 100 years were mostly about education and display, the second 100 will focus on its more vital role: collecting, analysing and conserving the flora of some of the world's most endangered environments. Research has always been the heart and soul of the garden, with multi-discipline – and multi-university – collaborations at the forefront of its programs into the next century.

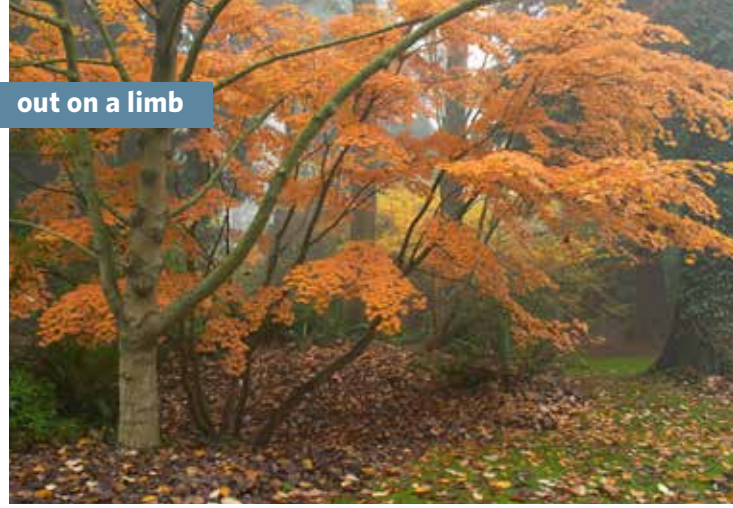
The Botanical Garden is a department within the Faculty of Science, and as such has a mandate to expand our knowledge of the genesis, propagation, protection and sustainability of a vast diversity of plant life. The university's Centre for Plant Research, which is affiliated with the garden, conducts research into topics such as plant

biodiversity, evolutionary genomics, hybridization, gene duplication and the effects of invasive species on native plants.

The garden's collection includes extensive samples of maples, magnolias, mountain-ashes, snowbell trees and rhododendrons. These genera have many species in the temperate areas of the world and are, to some extent, canaries in the coal mine when it comes to climate change, development, deforestation and other events that have a negative impact on their environment. Researchers collect samples from around the world to create living (and reproducible) stores of endangered species. For example, *Acer pentaphyllum*, or five-lobed maple, is extremely rare in the wild, with fewer than 140 individuals left. The garden has a collection of this species, which it has cultivated, and conducts research to see how well it can survive in different climates. Magnolias, as well, are in trouble with more than half of the species under threat in the wild. The drone project is being conducted in the temperate forests of northern Vietnam, where logging, farming and encroaching civilization are stripping forests at an alarming rate. These forests are extremely biodiverse, with magnolias and other genera under particular threat. The garden is collaborating with other institutions to develop a catalog of flora in areas like this, collecting samples of seeds and living material for research and generation. As well, new species of magnolia have been discovered, and the garden hopes to obtain some of these and begin a cultivation program.

Another intriguing project involves ornamental cherries in the Lower Mainland. These ornamentals, mostly imported from Asia, have been part of the west coast urban flora since the earliest days of the city. The vast majority of the trees we see on our streets today are clones of the original plants (ie, grown from clippings or grafted onto healthy root stock), because this particular genus of tree is highly subject to disease and the importation of plants from Asia is now banned.

Magnolia sargentiana 'Bloodmoon' (UBC 25230-5283-1986) is a cultivated selection of a Chinese magnolia species that is considered vulnerable in the wild by the International Union for Conservation of Nature. (Photo: Daniel Mosquin)



Top Left: David C. Lam Asian Garden. Bottom four images: Nitobe Memorial Garden. (Photos: Daniel Mosquin)

Official Alumni Association Plant

One of the Botanical Garden's functions has been to produce cultivars that can be marketed commercially at local horticultural outlets. One of these is the 'Purple Haze,' or shrubby penstemon. This was introduced as the Alumni Association's Diamond Jubilee plant in 1992 to celebrate the 75th anniversary of the founding of the Association. As the announcement in the spring 1992 edition of the *Alumni Chronicle* said, "Purple Haze" "forms a solid mound of colour for several weeks and is excellent for cascading over rock walls on well drained, sunny banks and in alpine gardens." Contact your local nursery to find out where to get this plant.



Many of these rare specimens are, in fact, diseased, and many are just old and unhealthy. Douglas Justice is working with the Vancouver Parks Board, the BCIT Biotechnology program and the Cherry Blossom Festival to collect and propagate samples of the plants with an eye to saving these trees for future planting. In some cases, there are only one or two individuals left from specific cultivars.

One of the big projects currently underway at the garden is to increase the area under irrigation and effectively double the collection area where cultivars of endangered species – such as cherries, magnolias and maples – can be grown and observed. Last summer the collection area was itself threatened because of the unusual drought in the Lower Mainland, putting many endangered species at risk.

The garden publishes a biennial Index Seminum – a list of seeds collected in the year – and offers these seeds for exchange with other gardens and scientific institutions. As well, the garden is part of the North American Plant Collections Consortium, which maintains collection standards and helps in the distribution of seeds for research. The Belgium-based Franklinia Foundation has supported the garden since 2002 to conduct collection and conservation research into at-risk trees including maples and magnolias in Vietnam and China. Working with Asian university partners, this work increases understanding of the biodiversity of the region, and helps illuminate concerns that might impact forest health. It is in this area that the drones come into play, accessing and collecting specimens from an otherwise inaccessible forest canopy.

Closer to home, the garden is involved with the Pink Mountain project in the north east corner of BC. Pink Mountain is known for its cache of marine fossils from the Mesozoic Era, but also because its flora differs

The garden's collection includes extensive samples of maples, magnolias, mountain-ashes, snowbell trees and rhododendrons. These genera have many species in the temperate areas of the world and are, to some extent, canaries in the coal mine when it comes to climate change, development, deforestation and other events that have a negative impact on their environment.

significantly from nearby areas. Researchers collect seeds and specimens and set up monitoring protocols for long-term analysis on the effects of climate change in the region. The biodiversity of this area is unique and there are efforts to turn it into an ecological reserve.

The garden is a member of the Canadensys project, and its researchers make important contributions to the international effort to register DNA sequences of various plant species. As well, the garden's volunteer organization, FOGs, spearheads a 20-year project to study the seasonal cycles of the magnolia collection to monitor the effects of climate change.

Ultimately, facilities like the UBC Botanical Garden have evolved into essential depositories not only of knowledge, but of a vanishing part of our world. As our climate shifts, many families of plants will become first endangered, then rare, then extinct. Without these collections with their depth of research and knowledge there would be no chance of introducing old species into new environments, or of saving those on the brink of disaster. In this way, the projects undertaken by the garden make them a vital part of UBC's research contribution to our world, and put it on the map as one of the best of its kind.

A drone flying above the Botanical Garden at any time of the year would show that it's one of the most beautiful facilities on campus. What it might not show is that it's also one of the most dynamic. For more information on the garden, visit www.botanicalgarden.ubc.ca.

On May 28 there will be complimentary admission to the UBC Botanical Garden, including the Nitobe Memorial Garden, as part of a special event for alumni called UBC100: What's Next? Find out more about available activities and register at www.alumni.ubc.ca/whatsnext/ (Please note that admission to the garden requires pre-registration.)



A drone is used to help map new and existing plant species in thick forest areas of northern Vietnam. (Photo: Andy Hill)



John Davidson established UBC's Botanical Garden at Point Grey and was its first director. (Photo: UBC Botanical Garden Archives)



Patrick Lewis, the garden's current director. (Photo: Daniel Mosquin)



WHAT TO SEE IN THE GARDEN IN MAY: (Photos: Daniel Mosquin)

TOP (L-R)

- Arisaema sikokianum* (snow rice-cake plant)
- Trochodendron aralioides* (wheel tree)
- Scilla peruviana*

MIDDLE:

- Halimocistus wintonensis* 'Merrist Wood Cream'
- Kadsura interior*
- Enkianthus campanulatus*

BOTTOM:

- Galium odoratum* (sweet woodruff)
- Picea sitchensis* 'Bentham's Sunlight' (golden spruce)
- Embothrium coccineum* (Chilean fire bush)

FOGs: Friends of the Garden

The spring 1976 edition of the *Alumni Chronicle* contained an announcement that started, "Wanted: Alumni with green thumbs or wishing to cultivate same..." and invited them to call the Botanical Garden. Seven alumni responded, and the FOGs were born. The garden, under then director Dr. Roy Taylor, was poised to expand both its offerings and its educational component and needed volunteers to seed the programs. With an upper limit membership of 160, the FOGs have been a constant source of support, direction and funding.

FOGs help organize and operate the annual Apple Festival, one of the garden's most popular public activities. The first festival in 1991 attracted under 1,000 apple lovers, featured 26 varieties on sale, and sold 3,700 pounds. The 2015 Apple Festival attracted 14,000 people over two days, featured 69 varieties, and sold 37,000 pounds of apples.

Hiligaxste':

LEADER OF MEN

Canada's new Justice Minister, Jody Wilson-Raybould, LLB'99, experienced a culture and upbringing that set her on a course for leadership.

BY ROBERTA STALEY

Canada's new Justice Minister Jody Wilson-Raybould, LLB'99, with Prime Minister Justin Trudeau, BEd'98.

The Women's Warrior Song – a powerful Aboriginal chant accompanied by the pounding of traditional hand drums – is often heard at public gatherings in Canada to mourn murdered and missing Aboriginal women. But the song is also celebratory, sung by First Nations men and women at cultural events.

On January 23, three women, led by Musqueam artist-activist Audrey Siegl wielding a scallop-shell rattle, sang the Women's Warrior Song to herald in Jody Wilson-Raybould's first official speech as Canada's new Justice Minister and Attorney General. Wilson-Raybould is only the third woman to assume the mantle of Canada's most senior legal office, and the first Aboriginal person. As befits the song's duality, there were also underlying traces of sorrow. More than a century of racism is burned into the memories of the many Aboriginal people who were part of the 350-strong audience at the Simon Fraser University lecture hall – a bitterness reflected in the tearful and sometimes angry questions posed to Wilson-Raybould following her talk.

A 1999 graduate of UBC's Allard School of Law, Wilson-Raybould came to power during Canada's 42nd general federal election, held on October 19. Nearly 10 years of rule under Stephen Harper's Conservatives had engendered what the *New York Times* called a "subtle darkening of Canadian life," noted Wilson-Raybould, MP for the new federal riding of Vancouver Granville. It was time for Canada to become, once again, a "beacon of hope and optimism" – the flag bearer of foundational principles and values that the rest of the world could look up to, she told the audience.

But old foundations often need shoring up. On the cusp of the country's 150th birthday, Canada's foundation has been sundered by decades of systematic discrimination towards First Peoples. Most infamously this includes the forcible removal of about 150,000 First Nations, Inuit and Métis children from their homes into residential schools, a form of cultural genocide that still reverberates today in social, health, economic, education and political spheres. That an Aboriginal woman should become Canada's Justice Minister at this point in history is an irony not lost on Wilson-Raybould. Not so long ago, the 45-year-old member of the We Wai Kai Nation of northern British Columbia "would not have been able to vote, let alone run for office, nor be recognized legally as an Indian and a lawyer. It takes a moment to sink in," Wilson-Raybould admitted. Now she is in charge of administering the very same laws that she fought against as a BC Treaty Commissioner and Regional Chief of the

BC Assembly of First Nations, when she confronted issues like the Northern Gateway pipeline and the Conservative federal government's legislative agenda that she said often ran contrary to the rights and needs of Aboriginal people.

The enormity of the challenges facing Wilson-Raybould sunk in quickly; her appointment as Justice Minister during the November 4 swearing-in ceremony at Ottawa's Rideau Hall was followed by 16-hour days of briefings and nights with only four hours of sleep. The resulting plan of action for Canada is sweeping, spelled out in a 2,300-word mandate letter signed by Prime Minister Justin Trudeau – himself a 1998 UBC alumnus from the Faculty of Education and the university's first graduate to lead a party to victory and become Prime Minister. The letter maps out a future of sea changes – especially for Aboriginal peoples. The time has come, Trudeau wrote in the letter, "for a renewed, nation-to-nation relationship with Indigenous peoples, based on recognition of rights, respect, cooperation, and partnership."

The justice system is an area where inequalities against Aboriginal people are most glaring. The incarceration rate is 10 times that of non-Indigenous people. Although only four per cent of the population, Aboriginal people today make up nearly a quarter – 22.8 per cent – of federal, provincial and territorial inmates, states Public Safety Canada's 2012 Corrections and Conditional Release Statistical Overview. Wilson-Raybould herself put Aboriginal offenders behind bars during four years as a Crown prosecutor in Vancouver's crime-ridden Downtown Eastside. "There is an overwhelming over-representation of Indigenous peoples in the criminal justice system," she said. "Certainly, there are criminals that need to be punished or account for their actions, but there are also other reasons why people are there. These are issues of poverty, issues of marginalization and mental health issues." What lies before her now, Wilson-Raybould added, is a social obligation and contract to move towards a "more restorative approach to justice – figuring out how we can reduce the demand on the system, and prevention."

One of Wilson-Raybould's UBC law professors, John Borrows, who now teaches at the University of Victoria, is confident in his former student's abilities to initiate and nurture change in Canada's legal system as it pertains to Aboriginal justice. "The causes behind criminal behaviour are complex and require approaches that deal with civil society more generally," says Borrows, the Canada Research Chair in Indigenous Law and Nexen Chair in Indigenous Leadership. "Jody is well equipped to tackle the roots of these problems. Her experience will help shift Indigenous issues while she is in office."

One of the pledges made by the Liberal Party of Canada during last year's long election campaign was the launch of an inquiry into missing and murdered Aboriginal women. In 2014, RCMP reported that 1,017 Aboriginal women had been murdered between 1980 and 2012, and 164 were missing. Groups like the Native Women's Association of Canada, however, estimate the number to be as high as 4,000. Set to begin this summer, the inquiry will be contentious, with police competency and possible apathy towards Aboriginal people coming under the microscope.

Borrows predicts that Wilson-Raybould will handle such potentially divisive initiatives with diplomacy. "She sees the bigger picture and has significant experience in working to address challenges faced by Indigenous people in many walks of life," he says.

The other issues facing Wilson-Raybould are equally controversial and complex, including the exploration of sentencing alternatives to incarceration. BC has considerable experience in this area, having created First Nations Courts in 2006 to support reconciliation and healing plans for Aboriginal offenders. (The efficacy of this system is currently being studied by Shelly Johnson, an assistant professor at UBC's School of Social Work.)

The legalization and regulation of marijuana is also on the table, as is toughening criminal laws and bail conditions in domestic assault cases. Right-to-die legislation has also come to the forefront, after a Supreme Court ruling in February last year struck down a law criminalizing assisted suicide. Last month, the Justice Department introduced new legislation in the form of Bill C-14 on doctor-assisted dying, which has already attracted criticism for being too restrictive, and calls for its amendment. The debate around this highly complex issue is likely to continue.

Wilson-Raybould is facing challenging and groundbreaking legal decisions requiring adept consensus-making skills, a comprehensive knowledge of the law and self-confidence – as well as a thick skin.

Wilson-Raybould's other responsibilities include working to reduce the number of handguns and assault weapons on Canadian streets. She will also support the Minister of Public Safety and Emergency Preparedness, Ralph Goodale, repeal key elements of the controversial *Anti-terrorism Act* known as Bill C-51, and introduce new legislation that better balances collective security with the *Charter of Rights and Freedoms*. The bill was ushered in by the Conservatives following separate attacks in October 2014 on Canadian soldiers in Ottawa and St-Jean-sur-Richelieu, Quebec.

Clearly, Wilson-Raybould is facing challenging and groundbreaking legal decisions requiring adept consensus-making skills, a comprehensive knowledge of the law and self-confidence – as well as a thick skin. Such attributes cannot be cultivated simply within the milieu of post-secondary education or even law school. They are seeded early in life and nurtured by culture. As a member of the We Wai Kai Nation, Wilson-Raybould is one of the Kwak'waka-speaking peoples. Her native name, Puglaas, means "woman born of noble people" and was given to her during a potlatch, the basis of Aboriginal government, on Gilford Island in BC. Wilson-Raybould's grandmother's name was Puugladee, the highest-ranking name in the clan. "My grandmother, Puugladee, ensured that both my sister and I knew our culture, our values, the laws of our Big House and how to conduct oneself as a leader," Wilson-Raybould said.

Some Aboriginal societies trace descent through the mother, with wealth, power and inheritance passing through the maternal line. This creates gender roles that are complementary rather than hierarchical, allowing women to take on powerful leadership positions. "In our system, I am Hiligaxste'," Wilson-Raybould said. "One of my jobs is to lead the Hamat'sa, or the chiefs, into the Big House. The Hiligaxste' can be defined as one who corrects the chief's path. We show them the way. Symbolically the power of the Hamat'sa is tamed, tempered then propelled." That women are natural, as well as essential, leaders of men is a notion controversial even in modern society.

Wilson-Raybould's father is Chief Bill Wilson, himself a UBC law school graduate (1973). Wilson achieved national fame when he and former Prime Minister Pierre Trudeau locked horns during a discussion of proposed amendments to the Constitution supporting Aboriginal rights at a First Ministers' Conference in Ottawa. (Wilson and other native leaders eventually succeeded; a Constitutional amendment was passed and approved guaranteeing Aboriginal and treaty rights.) The debate was also the first time that Wilson introduced his daughters, Jody and elder sister Kory, to the public. "I have two children [on] Vancouver Island, both of whom for some misguided reason say they want to be a lawyer," Wilson told Trudeau. "Both of whom want to be the Prime Minister. Both of whom, Prime Minister, are women."

At the time, Wilson-Raybould was watching the exchange live on TV with her Grade 6 classmates. "I was really embarrassed to sit in my class

Some Aboriginal societies trace descent through the mother, with wealth, power and inheritance passing through the maternal line. This creates gender roles that are complementary rather than hierarchical, allowing women to take on powerful leadership positions.



Justice Minister Wilson-Raybould also gave a presentation in March at the Robert H. Lee Alumni Centre. (Photo: Don Erhardt)



Minister Wilson-Raybould with students from Allard Law's Indigenous Legal Studies Program at UBC. (Photo: Don Erhardt)

and watch this, and everybody was looking at me," she recalled. The comments also communicated love and support. She feels her father was affirming that he had fantastic kids who knew the value of sticking to decisions and working hard to achieve their goals.

Wilson says that it is his former wife, Sandra (Sandy), who deserves much of the credit for how well the siblings turned out. A life spent on the road, fighting political battles on behalf of Canadian First Nations, meant that Wilson was seldom home. "The reality is, Sandy raised Jody and Kory as a single mom," he admits. (Kory Wilson also attended UBC Allard School of Law, graduating in 1999. A respected Aboriginal scholar, she is the current executive director of Indigenous Initiatives and Partnerships at the British Columbia Institute of Technology.)

Sandy, who is not of Aboriginal descent, still goes by her married surname Wilson, and resides on the Cape Mudge Reserve, part of the We Wai Kai Nation's lands on northern Quadra Island in BC. She brought up her two girls off reserve, first in Port Hardy then in the town of Comox on Vancouver Island. A teacher, Sandy ensured both youngsters received lots of "consistency, love and care," while insisting they hone a solid work ethic: "if they started something, they had to finish it." Homework was a priority, and the pair had to make the honour roll before they could partake in theatre, swimming, or track and field, which both excelled at.

Kory was quieter and studious, Jody the wild child who once shinned up to the top bar of a swing set as a two-year-old. "Jody came into the world full of life," Sandy recalls. One day, Mom and the girls were musing over what topic Jody should choose for her final Grade 7 public-speaking assignment. As the family risk taker, it wasn't unusual for Jody to end up in the emergency room needing stitches to close yet another gash. "Kory said, 'why not do it on your stitches?'" The three began counting, stopping when they reached 200.

Although largely absent, their father's presence was always felt. Sandy recalls the historic day in 1990 when Elijah Harper, a Cree chief and Manitoba provincial member of the New Democratic Party, refused to accept the Meech Lake Accord. The Accord didn't grant guaranteed rights to Aboriginal peoples, causing Harper and other First Nations leaders to oppose it. It lost political support and ultimately failed. After this momentous event, which was considered a turning point in the history of indigenous peoples in Canada, Wilson arranged for his daughters to speak on the phone with Harper. For Jody, the experience could only have established an unqualified acceptance that Aboriginal interests had a place in national and provincial politics.

Wilson-Raybould, who is married to University of Cambridge alumnus Tim Raybould, eventually channelled her energy into more studious pursuits, as well as Aboriginal politics. Today, says Kory, her sister "is one of the hardest working ministers there is. Whether she is Aboriginal, or female, is irrelevant to the job that she will do as Justice Minister." But she also expects that Wilson-Raybould's dedication and competence will help change negative attitudes that still linger towards women and Aboriginal people.

Cultural, educational and familial factors all led to history being made on November 4 when Wilson-Raybould was appointed Justice Minister. But perhaps the biggest factor of all is simply the zeitgeist – it was time, as Justin Trudeau famously remarked after choosing his cabinet. Now, Wilson-Raybould is living up to her name: Hiligaxste' – a leader not only of men but all Canadians. 🇨🇦

Alumni Members of Cabinet

Rt. Hon. Justin Trudeau, BEd'98, Prime Minister

Hon. Jody Wilson-Raybould, LLB'99, Minister of Justice and Attorney General

Alumni Members of Parliament

**William Amos, MA'99
LPC**

**Richard Cannings, BSc'75
NDP Critic – Post-Secondary
Education; Natural Resources**

**Arnold Chan, LLB'93
LPC, Deputy House Leader
of the Government**

**Julie Dzerowicz, MBA'97
LPC**

**Hon. Ed Fast, LLB'82
CPC, Shadow Cabinet –
Environment and Climate Change**

**Randall Garrison, MA'77
NDP Critic – Public Safety
and Emergency Preparedness;
National Defence; LGBTQ Issues**

**Pam Goldsmith-Jones, BA'86, MA'88
LPC, Parliamentary Secretary to the
Minister of Foreign Affairs**

**Randeep Sarai, BA'98
LPC**

**Hon. Alice Wong, BEd'82, MEd'85, PhD'93
CPC, Shadow Cabinet – Small Business**

**Bob Zimmer, BEd'04
CPC, Deputy Critic – Families,
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Chris Friesen outside the new Welcome Centre for refugees and new immigrants. (Photo: Martin Dee)

When Chris Friesen arrived in Kenya in 1990, the nation was navigating a bumpy road towards multi-party democracy. New political parties, such as the Forum for the Restoration of Democracy, had been outlawed and its members jailed. Violence gripped the country and many were dying in tribal conflicts.

A recent UBC grad, Friesen had been hired to oversee administration of the Kenyan office of the Windle Charitable Trust, an education NGO that was partnered with the World University Service of Canada's (WUSC) Student Refugee Program. The WUSC initiative helped promising young African students whose lives had been uprooted by conflict to escape their situation and attend a Canadian university or college as refugee students. Tuition would be free and living expenses subsidized. Friesen's responsibilities included organizing candidates' academic records and dossiers and forwarding them to WUSC's Ottawa office, which would coordinate a placement in a Canadian post-secondary institution.

If only it had been that easy.

Alongside the political turmoil, HIV/AIDS was ravaging the population. Although AIDS had been diagnosed among sex workers in the 1980s, Kenya was in a state of denial about the disease; it would be 1999 before the government declared it a national disaster. "It was the beginning of the AIDS pandemic in Kenya and very hush-hush," says Friesen. "I saw, first-hand, students dying of AIDS. I measured coffins and made arrangements to return the remains of victims to their home town."

Students also faced the wrath of the Kenyan government. Some were rounded up and imprisoned without reason. Friesen would find himself at a Kenyan jail, negotiating with officials "to try to extradite our students." Was he ever in danger? "I was pretty naïve," Friesen shrugs.

Friesen returned to Vancouver following two years in Kenya, but never forsook the plight of refugees. He immediately stepped into the position of director of Settlement Services at the Immigrant Services Society of BC (ISSofBC), a role he has held for 24 years. Since last December, he has been overseeing the welcome, homing and care of Syrian refugees.

Friesen is renowned nationally and globally for his advocacy for refugees and immigrants, founding the Canadian Immigrant Settlement Sector Alliance and sitting as its current president. Friesen also embraced an international role in 2013 when he was appointed NGO Focal Point for the Annual Tripartite Consultations on Resettlement in Geneva, Switzerland.

How Friesen became a champion of the world's most vulnerable is motivated, ultimately, by a profound sense of justice. Such idealism took root in early childhood and influenced the trajectory of his UBC undergrad career. He became immersed in student politics, bent on changing the world – or at the very least making improvements. It fuels his current work with refugees, resulting in

the ongoing settlement of 1,800 Syrian refugees into BC, a Herculean task that has involved up to 80 full-time staff coordinating short- and long-term accommodations and arranging dental and medical care for families of up to 13 whose lives have been shattered by the brutal Syrian civil war. (At least another 1,500 or so Syrians will arrive in BC by the end of this year.)

During last year's negotiations with the United Nations High Commissioner for Refugees, Canada agreed to take the poorest and most vulnerable among the estimated 4.7 million Syrians housed in refugee camps, rented apartments and even open fields throughout parts of the Middle East and Europe. So far, most of these who've arrived in Canada are families. Many are from Daraa, the so-called cradle of the Syrian revolution. It was here, in March 2011, that students aged 10 to 15 painted anti-government graffiti on walls, triggering a violent crackdown by authorities. "Some are survivors of torture," says Friesen. "We've seen everything imaginable: shrapnel, cancer, kidney dialysis, blindness, deafness, and people in wheelchairs. They have very little English. The daunting challenge is to integrate these newcomers and future Canadian citizens into society."

According to the Department of Immigration, Refugees and Citizenship, there are now more than 25,000 Syrian refugees who've arrived in Canada since last November under the Liberal government's \$678-million, six-year plan for refugee resettlement.

Friesen is confident that the path to integration will be slow but steady. He says the Syrians, like the thousands of other refugees he has helped settle in his career, have a remarkable resilience. "They want to contribute to this country – their new home – they are so grateful for the opportunity that they have been provided."

The support from ordinary Canadians has been key in helping Syrians start to feel they have safe haven in a nation that is so different from their own. Canadian generosity was also important to Friesen and his staff during the seven-day work weeks they spent settling the refugees over a period of several months. "What kept myself and my team going was the enormous positive support from the public," he says. "We went from 800 or 900 volunteers to close to 6,000."

The challenge of settling refugees, and helping them find employment, housing, dental and health care as well as counselling to overcome post-traumatic stress disorder (PTSD), will be eased considerably by the imminent opening of the \$24-million ISSofBC Welcome Centre, a 58,000 square-foot facility at 2610 Victoria Drive, located about a block from the SkyTrain station at Commercial and East Broadway on a parcel of land leased from the city.

While the project has caused Friesen many "grey hairs," it has been "a labour of mostly love." The programs offered will be myriad and include first-stage housing units for newly arrived refugees, ESL classes, a law clinic, youth drop-in, child care and a Vancouver City Savings Credit Union (Vancity) kiosk, among other services. The grand opening is June 25. "It is the first facility of its kind in the world," says Friesen. "We are taking what a refugee or immigrant would need in their first few months in Canada and putting it under one roof to provide enhanced front-end support. It is the creation of a new international model for the integration of refugees."

The new facility has been a long time coming. The current Welcome House has been in operation since 1986 at the same yellow-brick, three-storey building on downtown Drake Street. It is the first port of call for all government-assisted refugees after stepping off a plane at Vancouver International Airport. Smelling vaguely of mould, with overheated offices, low ceilings, flickering neon lighting and laminate flooring, the Drake Street facility has been Friesen's workplace since he was first

hired as the director of Settlement Services in 1992, a position that "brought together so much passion and so many interests" after his two-year stint in Kenya.

Such passions and interests were nurtured in a family where helping others was second nature. Friesen's dad, Harvey, whose Mennonite relatives fled Russia to escape religious persecution, and his mother, Nancy Friesen, were active in the United Church in their home in Ladner, BC, 25 kilometres south of Vancouver. The Friesens were

part of a group that sponsored a family from Vietnam following the Viet Cong's capture of Saigon in 1975. Friesen came to know the family, part of an estimated 800,000 so-called "boat people" who fled the Southeast Asian nation in overcrowded vessels. "The impact of war coming to a small town like Ladner – a very homogenous farming and fishing community – it was an extraordinary experience," Friesen says.

Following graduation from high school, university wasn't a priority and Friesen worked odd jobs, once as a sleeping-car porter for Via Rail Canada. When he finally arrived at UBC as a mature student, he

"We are taking what a refugee or immigrant would need in their first few months in Canada and putting it under one roof to provide enhanced front-end support. It is the creation of a new international model for the integration of refugees." – Chris Friesen

GIMME SHELTER

The Canadian government says it plans to welcome 56,000 refugees by the end of the year. Chris Friesen, BA'88, is at the forefront of a new approach for their successful integration.

BY ROBERTA STALEY

Located in East Vancouver, The Welcome Centre is due to open this June. (Photo: Martin Dee)

undertook a double major in history and political science (1988), focusing on international development. It was here he met his future wife, Manuela, a UBC international relations graduate (1987) and TOEFL English prep teacher who moved to Kenya with Friesen to teach English.

Not one to be stuck reading textbooks, Friesen joined UBC's local WUSC committee. He was inspired by history professor Dr. John Conway, whom he considers a mentor. Conway was faculty rep of WUSC and involved in international refugee issues. WUSC, says Friesen, "was right up my alley." One of the main initiatives that Friesen promoted with WUSC was the creation of the Student Refugee Program. It could be funded, Friesen thought, by boosting student fees at UBC by 50 cents a year. A referendum was held and WUSC members promoted the cause by plastering the campus with posters pointing out that Nobel Laureate Albert Einstein was a refugee, having fled Germany's Nazi regime in 1933. Shockingly, the referendum didn't pass. Friesen demanded a recount.

As it turns out, the referendum had indeed passed – by 22 votes. The program endures today and the current fee of \$2.61 supports four new refugee students every year. This past March, students passed another referendum to increase the annual fee to \$5.22, allowing double the number of refugees to attend university. The impetus for the increase came from students' concerns over the ongoing Syrian refugee crisis, Conway says.

Conway, who at 86 is now professor emeritus in UBC's History Department and still stays in touch with his former student, describes Friesen as "generous, very hard working, with great sympathy for those in need." He had these same characteristics when he first joined WUSC, Conway says – traits that helped create long-lasting change at UBC. "It has been 35 years since Chris Friesen initiated this idea – 35 years of supporting refugee students' board and lodging, pocket money, new clothing, books and so forth."

Friesen's determination and drive to help desperate refugees is something that the rest of UBC could aspire to, says Dr. Dan Hiebert, a professor in the Department

of Geography who researches international migration, Canadian immigration policy and national security as it relates to human rights. Hiebert has been involved in informal talks with UBC at the senior administrative level, encouraging the university to undertake a coordinated response to the Syrian refugee crisis by supporting the new programming at the ISSofBC Welcome Centre. Many services at the centre will require highly skilled staff, which could be provided in part by UBC's panoply of expertise from the faculties and departments of dentistry, medicine, social work, law and business, Hiebert says. Psychiatric services, for example, will likely be in high demand. While the Vancouver Association for the Survivors of Torture (VAST) has counsellors, Hiebert expects they will be "enormously stressed" trying to meet all the needs. "No one really knows the extent of the PTSD among the Syrian population, but it's expected to be significant."

It's not just the services and staff that will be stretched. Two other key challenges are housing and language acquisition. The average level of education among the first 17,000 Syrian refugees into Canada is below Grade 9 and Hiebert says the illiteracy rate is unexpectedly high. "It's incredibly difficult to learn a new language when you've never learned the grammatical structure of your own," he says. Greater Vancouver's housing problems, meanwhile, have become notorious in the past several years. Rental units are not only scarce but expensive – certainly beyond the BC Ministry of Social Development and Social Innovation's shelter assistance rates, which were set in 2007, Hiebert says. For example, the maximum shelter allowance for a family of five is based on existing provincial rates.) Such financial challenges are exacerbated by Ottawa's plan, announced in early March, to force privately sponsored Syrian refugees to repay the cost of their airfare to fly to Canada, Hiebert adds. (Ottawa normally requires refugees to pay the cost of their travel

to Canada but waived that requirement for the government-sponsored Syrian refugees.)

The integration challenges facing Syrians refugees are indeed, as Friesen says, daunting. Yet they pale in comparison to what the Syrians have already endured. So long as British Columbians continue to commit time, services or things like rent subsidies, Friesen is confident that the many hurdles will be overcome. "The principles and values of being a Canadian resurfaced as a result of this bold humanitarian endeavour," he says. Friesen is calling upon Canadians to take an even bolder stance. The government says it plans to welcome nearly 56,000 refugees by the end of 2016, not only Syrians but people from Colombia, Eritrea and the Democratic Republic of Congo. This, however, is a drop in the bucket compared to the 60 million refugees worldwide. Canada should not only provide safe haven to some of these displaced people, says Friesen, but also devise concrete solutions with other countries to address the dire regional security issues that are worsening the refugee disaster.

For the most part, Canada is a land of refugees and immigrants; if we, individually, didn't come here from another country, our recent forebears did. Our collective lineage is drawn from all four corners of the globe, yet these differences are our strength, with many patterns and colours woven into a cultural mosaic that has created one of the most tolerant and generous nations in the world. There are few times in history when the world has been burdened by such a vast number of homeless, destitute and desperate people. For Friesen, it is only Canadian to open our arms to many more of them. "My generation was defined by our experience as children with the Vietnamese boat people. Today's generation will be influenced by Canada's leadership in responding to the Syrian crisis." [T](#)

"My generation was defined by our experience as children with the Vietnamese boat people. Today's generation will be influenced by Canada's leadership in responding to the Syrian crisis."
– Chris Friesen

Syrian and Iraqi refugees line up next to a fence at the Greek-Macedonian border February 27, 2016. REUTERS/Yannis Behrakis



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THE CLASS OF 1916



Some of UBC's Class of 1916 at a party thought to have been held at the home of Clausen Thompson. (Photo: UBC Archives)
 Back row: Jean Robinson, George Annable, Henry Gibson.
 Next row: Lawrence Luckraft, Gladys Schwesinger, F. F. Burrows Sexsmith, Sherwood Lett, D. Hugh Munro, Thomas Shearman, Harold Walsh, Thomas Robertson, Charles Duncan, Edward Mulhern, Clausen Thompson.
 Second row: Marjorie Dunton, Florence Chapin, Isabel MacMillan, Jean McLeod, B. Muriel Carruthers, A. Irene Vermilyea.
 First row: C. Belle Elliott, Ella Cameron, Grace Miller, A. J. Nancy Dick, Mary Wilson, Jessie Anderson.

Yearbook photos courtesy of AMS Archives.



After graduating, the Class of 1916 held regular reunions. The last one recorded in Menzies' scrapbook is Oct 30th, 1971 (their 55th anniversary) with six members attending. This picture was taken at their 1961 reunion. (L-R) **William Wilson, Isabel McMillan, Sherwood Lett** (class president), **Irene Menzies** (née Vermilyea, class secretary), and **Harry Logan** (a member of UBC's original faculty and honorary class president).



Ada Irene Menzies (née Vermilyea) was a member of UBC's first class, which graduated 100 years ago this May. She kept a scrapbook about her classmates for many years after graduation. The scrapbook, full of old newspaper clippings, is now in the hands of UBC Archives and is the source of much of the information below.

resources. **Jessie Anderson** was the first student to graduate from UBC. Her entry in the UBC annual 1916 mentions her interest in acting and involvement in the Players' Club, but, like many other members of her class, she went on to become a teacher. Also joining the teaching profession, for varying lengths of time, were **Ella Cameron** (head of the Victoria High School mathematics department), **Florence Chapin**, **Nancy Dick**, **Marjorie Dunton**, **Belle Elliot**, **Laura Lane** (head of commerce at Lester Pearson High School), **Jean Macleod**, **Isabel MacMillan** (a home economics teacher at Kitsilano High School), **Grace Miller**, **Jean Robinson**, **Edna Taylor**, **Irene Vermilyea**, and **Chitose (Josi) Uchida**, who was one of the first Japanese-Canadians to graduate from a Canadian university.



Chitose (Josi) Uchida

"Private Shearman went over the top with the supports at Vimy Ridge on April 9, 1917, and on April 12, while holding part of an old German trench was wounded. First-aid was given but he lay for twelve hours before being carried out of the trenches. He was invalided to England and died at Huddersfield War Hospital on April 27."



Thomas Shearman

"He went to France with a draft of the 46th Battalion in Feb, 1917, serving through the engagements at Vimy Ridge and Passchendaele, and being twice wounded, the second time so severely as to be invalided to England. He received his commission in September 1918. Lieutenant Duncan was killed at Canal du Nord in front of Cambrai, on September 28, 1918, while leading his platoon into action."



Charles Duncan

- Record of Service, 1914-1918, UBC (1924)

There were 40 members in the class, and 17 were women. Nine male students enlisted for service overseas in WWI before graduation and were granted degrees "without examination." **Charles Duncan** and **Thomas Shearman** lost their lives, as did **Edward Berry**, who was a Rhodes Scholar but wouldn't live long enough to realize his potential. He died in Oxford on January 28, 1920, of heart disease resulting from the effects of being gassed at Loos in 1917. The other members of the class to serve in WWI were **Ernest Le Messurier**, **Sherwood Lett**, who was awarded a Military Cross, **William Maxwell**, **Burrows Sexsmith**, **Percy Southcott**, and **William Wilson**.



Harold (Otto) Walsh

Maxwell, Sexsmith and Wilson went on to become teachers. (Wilson became known as "Mr. King Edward," after the high school where he was head teacher, and had also been a student. He also lectured in UBC's Faculty of Education). Le Messurier became a cartoonist, and Southcott a druggist. Lett, another Rhodes Scholar, also fought in WWII, during which he was wounded twice. He had a noteworthy military career and was awarded the CBE in 1945. He was the first president of the Alma Mater Society and later served on UBC's Board of Governors and Senate, and as Chancellor. He was called to the bar in 1922 and became Chief Justice of the Supreme Court of BC in 1955. Upon his death in 1964, his friend Prime Minister Lester Pearson said: "I know of no Canadian who has served his country in war and peace with greater distinction and more unselfishly." After graduation, other members of the class to have served during the war include **Harold (Otto) Walsh**, **Hugh Munro**, **James Galloway**, **Clausen Thompson** and **Ed Mulhern**. Munro taught for a while then became a dentist. Walsh earned a BAsC (Electrical) in 1925 and received an MBE in 1946 for his work in aviation navigation radio aids during WWII. Mulhern was class president, second president of AMS (succeeding Lett), and later first president of the UBC Alumni Association. Thompson was a lawyer with pioneer BC law firm Ladner and Cantelon, before moving to California. Nearly all members of the class graduated with a degree in Arts. (Science was included under Arts at that time. The faculty was renamed Arts and Science in 1922.) **Clive Elmore Cairns** was the exception; he took a double course in Arts and Applied Science and went on to become a prominent Canadian geologist, spending 35 years with the Geological Survey of Canada and contributing to the development of BC's mineral



Jessie Anderson

In 1931 Uchida started a night school for Japanese immigrants. It proved popular but closed during WWII, when Japanese citizens were expelled from their homes and businesses on the BC coast and sent to inland camps. An article published in the *Hundred Mile Herald* at the time of her retirement from teaching in 1961 said she helped other Japanese people who had been suddenly uprooted from their homes and business and that it was believed she was the last to leave. She taught Japanese children at Taylor camp in the Cariboo. The *Herald* described her as "a wiry person with a seemingly inexhaustible supply of energy." **Henry Gibson** taught, but later worked in advertising in New York. **Muriel Carruthers** taught and later became head of the Schools Department at Vancouver Public Library. She was involved in producing the *Alumni Bulletin*, an early alumni publication of the 1920s. Finishing top of the class was **Lennox Mills**. He was a Rhodes Scholar, eventually becoming a professor of political science at the University of Minnesota and a Guggenheim Fellow. **Roland Miller** took an MA in economics at the University of California and by 1921 was a lecturer in economics at the University of Oregon. **Gladys Schwesinger** taught briefly in BC but spent most of her life in the US where she earned a PhD and eventually became senior clinical psychologist of the California Youth Authority. She willed 50 per cent of her large estate to UBC "to establish and maintain a department of psychology" and a further 10 per cent to the Alumni Association, to help with record-keeping and the furthering of its work. **David Smith**, originally from Dundee, Scotland, became Reverend Smith. He was sent to Canton to study Chinese in 1919-21 to aid his Chinese Mission work in Canada. He was the long-time superintendent of Chinese Missions for the Presbyterian Church in Canada. **Lawrence Luckraft** also became a reverend and moved to England. At one point he served with the Mission to Seamen in Manchester, later moving to Cornwall. **Edward Logie** was a Presbyterian minister in Point Grey (1916-17), then sold insurance in BC's interior (1921-23) before becoming a pastor in the United Church. **George Annable** became a lawyer, and **Thomas Robertson** became a leader in BC's agricultural sector. **Mary Wilson** attended a business college and worked as a secretary at the Vancouver Publicity Bureau. □

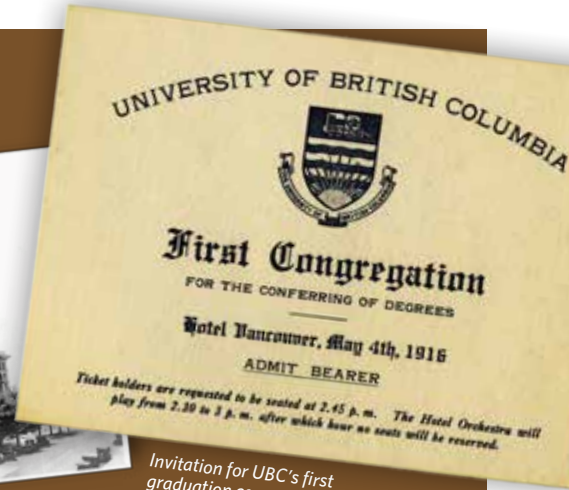


Lennox Mills



Gladys Schwesinger

Hotel Vancouver, 1916 (University of Washington Libraries Digital Collections)



Invitation for UBC's first graduation ceremony.

UBC's first congregation took place on the afternoon of May 4, 1916, in the Crystal Ballroom of the Hotel Vancouver at the corner of Granville and Georgia. (The hotel was demolished in 1949. The Hudson's Bay building is the only one of its peers still standing at that intersection.) The ceremony was preceded by a procession of officials, guests, alumni, faculty and students, who made their way from the court house (now the art gallery) to the hotel. It was headed by a section of the BC Company of Western University overseas Battalion. An article that ran the following day in the *News Advertiser* reported that the procession had been viewed by thousands: "Outside the hotel great crowds assembled, lining the route from the court house to the hotel entrance. So great was the throng around the court house entrance that the provincial police had to be called upon to assist in clearing the route. Cameras were to be seen at work on all sides, there being no less than three moving picture machines in use and scores of other photographers, professional and amateur, occupied every vantage point."

WHEN I WAS A STUDENT

We asked alumni to send in their memories of UBC, and here are just a few of the submissions. In many cases they have been edited for length. The full versions, along with other stories sent in that unfortunately we don't have room to include here, are available to read on the magazine's website: trekmagazine.alumni.ubc.ca



Gordon Shrum was head of Physics and Commanding Officer of the COTC. (Photo: UBC Archives)

J. PETER MCGEER, BA'44, MA'46

In my initial years at UBC the war was still on, and Gordon Shrum, head of the Physics Department,

was also the Commanding Officer of the COTC (Canadian Officers Training Corp). As able-bodied men, we were required to attend COTC parades on Tuesday and Thursday evenings, and on Saturday afternoons. Mostly we seemed to march in platoons and companies, but I did learn how to disassemble and reassemble Bren and Sten guns. Sometimes on the weekday afternoons we would be entertained by the gun crews on the Point having firing practice at a target towed up and down Main Mall by a Westland Lysander aircraft. We could lean out the windows of the Sciences building, interrupting our chemistry and physics labs, to jeer at the gunners who never got close to hitting the target sleeve.

DR. CLARENCE MADHOSINGH, BSc'54, MA'58

It was the first weekend after registration and, after settling into residence at Acadia Camp, Sam Haqq and I, students from Trinidad, were ready for our first Canadian haircut. We decided to go downtown by bus early on Saturday morning to see some of the city, have a haircut and be back in time for lunch at Acadia.

As we looked around at barber shops we found that the rates were \$2.00 and up (haircuts in Trinidad were 25 cents then). As this was too expensive for us we decided to try trimming each other's hair.

We bought a pair of cheap barber scissors and combs and

gave each other haircuts for the rest of our student days at UBC. Sam became so proficient (due to all the practice on my head) that soon his room became a virtual barbershop on Saturday mornings with friends coming for a wee trim.

Sam and I remained lifelong friends. While I was visiting him in 2013, he asked his brother, Tennyson Haqq, also a UBC grad, to give him a haircut. I immediately offered to do it instead, for old times' sake. We made jokes about the changes that had taken place since our haircuts in the 1950s. Sam was now blind from glaucoma and could not check on my mistakes with a mirror as he had done before. He had less



Joseph Perdue in the 1950s.

JOSEPH PERDUE, BASc'52

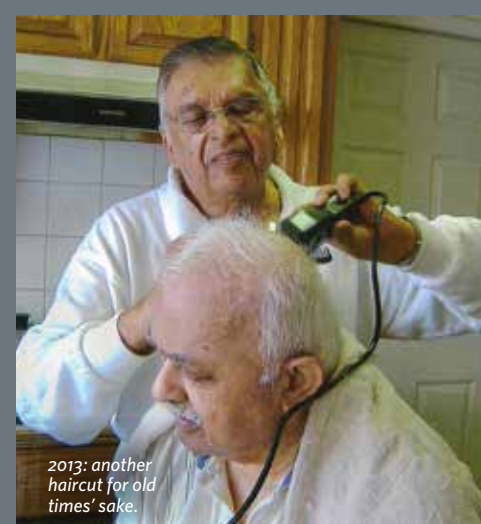
In 1952 I graduated in Electrical Engineering, one of the last groups of veterans from WWII to come through. We were given a chance by the government to further our education, a chance many of us

took. I spent happy years at UBC and made lifelong friends. The university also helped us to get summer jobs by providing us with addresses of companies looking for summer students. I went to the Yukon for three summers and in 1951 took a summer job in South Slocan with West Kootenay Power & Light Co. I met my wife there and we were married in December 1951. After my graduation we moved to Toronto, where we still live. Thanks to my education at UBC, I enjoyed a successful career until my retirement at aged 68. In 2016 I will be 95, and look forward to seeing my grandson, Dylan Perdue, graduate in engineering from the same university as I did 64 years ago.



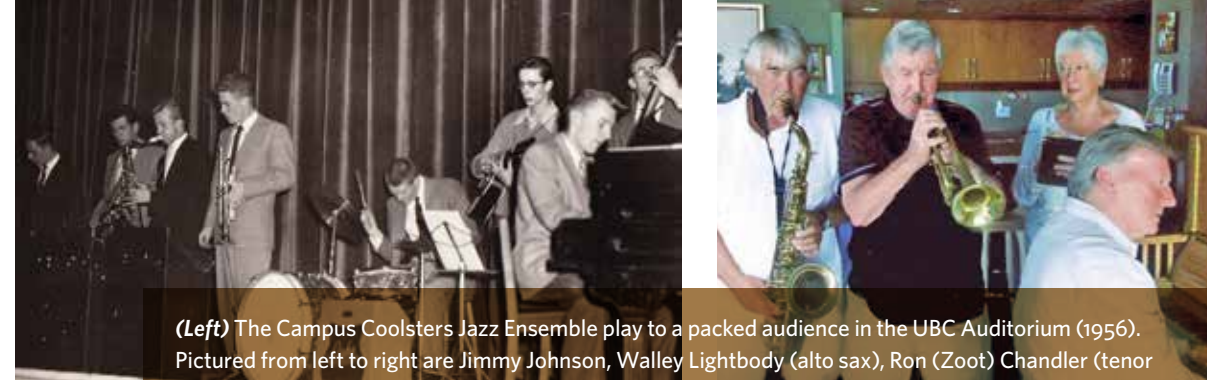
1954: Clarence Madhosingh and Sam Haqq (sitting) were students at UBC from Trinidad.

hair and it was now all grey. My eyesight was fading and my hands were shaking, and the cutting tool



2013: another haircut for old times' sake.

had advanced from scissors to an electric clipper. Sam passed away shortly after my visit.



(Left) The Campus Coolsters Jazz Ensemble play to a packed audience in the UBC Auditorium (1956). Pictured from left to right are Jimmy Johnson, Walley Lightbody (alto sax), Ron (Zoot) Chandler (tenor Sax), Jim Carney (trumpet), Sandy Ross (drums), Norval Garrard (guitar) and Brian Guns (piano), and Saxxy Johnson (bass).

(Right) Coolsters reunion: Walley Lightbody on tenor sax, Jim Carney on trumpet and Brian Guns at the piano. They are joined by Jim's twin sister the Hon. Pat Carney, former Minister of International Trade for Canada and editor of the *Ubyssy* during her time as a student. Submitted by Walley Lightbody, BA'56, LLB'59.



Members of the Sopron School of Forestry fled Hungary during the revolution and continued their studies at UBC. (Photo: UBC Archives)

ELIZABETH LEE, BHE'62

I was in a textile lab in the Home Economics building in the fall of 1958 or 59, when I noticed a large group moving down University Boulevard towards the War Memorial Gym. They were led by a young man in military uniform carrying the Hungarian flag, followed by a wreath-bearer, and what appeared to be the entire Sopron School of Forestry, students and faculty. It was a very moving sight. We were aware of the Hungarian Revolution, the Sopron School's escape to the West, and the invitation extended to these refugees to complete their education at UBC. The language barrier and shortage of space at the university made their transition difficult, but they worked hard, graduated, and made a real contribution to the forest industry of BC.

STEVE (ISTVAN) TOLNAI, BSF'59

I am a member of the Hungarian forestry group (Sopron Faculty of Forestry) that escaped from Hungary in October 1956 and was adopted by UBC as a separate Forestry Faculty. When we entered UBC, we had no idea what was expected of us, nor about the "politically correct" standard of the day and Canadian university traditions. So we decided to carry-on with our own traditions brought over from our homeland. Pretty soon we learned that some of them were frowned upon, and some of them were against the laws of our new home.

One of our favourite "traditions" was a good hollering session after a night of partying. One night, we decided to go down to Jericho Beach, where our so-called singing would not bother anybody. We piled into three cars (one VW Beetle, one black Hudson and a Mini Morris).

Twenty-one of us made it to the beach, although some of the party insisted that 24 started out.

The beach was empty and quiet, not a soul around. It suited our purpose very well. We settled down amongst the driftwood for a pleasant drinking and singing session. Initially it was quiet, but soon the volume increased and our singing could be heard at least a mile away. We were happy and somewhat drunk, and we forgot about all of our real-life problems and the loneliness felt.

The sound of police sirens blended nicely with our singing at the beginning, but soon our singing could not compete. Police cars were coming from all directions, half a dozen of them, and they stopped, sirens still whining, on the road beside us. Car doors popped open and at least a dozen cops started to walk briskly toward our (by now silent) group.

We had no idea why they had stopped. Some of us thought maybe they want to join us. They sure did not have to make such a big noise waking everybody up on their way to join our party! We opened a few more bottles of beer before they reached our group and, to show our friendliness and appreciation, we held them out and waved the police over to join us. (In Hungary every decent cop would have jumped at the opportunity to have a beer if it was offered.) To our surprise, they did not accept our offer, and actually seemed offended by our gesture. Their leader started to ask strange

questions, such as where were we from (Hungary), what were we doing (drinking), and what language were we speaking (Hungarian). We kept on drinking, and they looked more and more unfriendly, in spite of the fact that we kept offering them untouched bottles of beer. Their negative attitude was truly puzzling.

The leader started to make a long speech, most of which went over our head. He said something about not being allowed to drink on the beach and that we should not sing within the boundaries of Vancouver. He emphasized that he was a nice guy and that we looked ignorant and harmless. Because of this we would not be charged or spend the night in jail. We were told to surrender all unopened bottles of beer forthwith. Our respect for Vancouver's finest changed instantly: they will have their own party with our beer, we thought. Our English was not good enough to start an argument we might not win, so all the unopened bottles were brought forward and put at the feet of the leader. To our surprise he asked for a bottle opener. We gave one to him, grinning with pleasure - maybe he had changed his mind and would join us for a drink? He lifted up a bottle, opened it, examined the label and, with a big grin on his face, very slowly poured the golden liquid into the sand! This unholy act was repeated until the last bottle was empty. We did not feel the urge to sing after witnessing this cruel act. We all went home in silence, as instructed.

I have played this event many times over in my mind. The possibilities of how it could have turned out are endless. Fortunately, the cops realized that we were just a bunch of ignorant students who were new to Canada and did not have any appreciation or understanding of the many weird laws of the land. My heartfelt thank you goes to the Vancouver Police Force of 57 years ago.



The Ubysssey.

WHAT'S GOING ON HERE? Barry Graham, (right) a downtown Chartered Accountant student, is in the process of rescuing his speedboat from Empire Pool. The boat, which was stored on a trailer near Fort Camp, was apparently placed in the pool Halloween night. UBC students Baz French, (left) and Pete Hume (center) went for a spin in the pool before dragging the 500 pound boat back home.

LARRY FOURNIER, BCom'61

On Halloween night in 1955, a group of students – residents of Acadia Camp army hut dorms – decided to move an inboard speedboat (probably about 18 ft. long) that was mounted on a trailer and parked by the apartments located just outside of Acadia Camp and put it in the Empire swimming pool just west of the War Memorial Gym. After pulling the trailer to the parking lot by the gym and breaking the padlock on a wide gate in the fence, it probably took at least eight guys to lift the boat up and into the pool. It turns out that an accounting student who lived in the apartments owned the boat, and when he went to retrieve it the next day, he started it up at one end of the pool and a photographer took a shot of him behind the windshield and steering wheel, motoring down the pool and leaving a nice wake. The photo appeared in the *Ubysssey* newspaper and I still have a copy of that issue. Obviously, the owner had a sense of humour.

PETER HERKE, BAsC'63

The Physics building had a Coke machine. A bottle cost 10 cents and if you put in a quarter you got 15 cents back. After much trial and error, one of the budding engineers found that if you pushed a penny in with some force it would not be rejected. Doing it successfully three times rewarded you with a Coke and 15 cents change. Soon

all his friends had a go as well and the machine obliged. I don't know how long this would have gone on if one of the physics professors hadn't put in a quarter to buy his Coke and got three cents change!

ALAN COODE, BAsC'62, MSc'63

After attending summer school to take the first year maths course, I returned to UBC in early September to register in geology. I told the lady behind the counter that I wanted to take a degree in geology.

"Oh no!" she said, "you don't want to register in geology. You want to register in geological engineering."

"I do?" I asked.

"Yes, you do." She replied.

"Oh, OK." I said. "I want to register in geological engineering."

"That's better," she replied, and registered me in geological engineering. So I became an engineer and never looked back.

HELEN ROSE PAULS (NÉE GOERZEN), BEd'69

Disenfranchised in Russia after the revolution, my father's family was very grateful to be admitted to Canada in 1926. His life-long yearning for an education had to be shelved to help his family make a start in a new land. Later, as an adult, together with my mother, he acquired a small farm on the Sumas Flats between Abbotsford and Chilliwack, which Mother

managed while he drove the old highway to Vancouver to work as a labourer. His dreams of an education he passed on to his five children. From one of his jobs he brought home boxes of perfectly cut cubes of leftover mahogany, wood he particularly enjoyed working with, which he told us he was using to create a decorative wall at UBC. My siblings and I spent many happy hours building, stacking and creating with those blocks. With his encouragement, I realized my dream of becoming a teacher, entering the Faculty of Education in 1966. There in the student lounge, covering one whole wall in an ornamental display, was the original mahogany of my childhood.

MAURICE PREVOST, BSc'72

My all-time favourite washroom graffiti comes from my UBC student days. I think it was in the Hennings building, because I was a physics major. The graffiti said: "Time is merely a device to prevent everything from happening at once... and it doesn't work." QED.

BILL WILSON, LLB'73

It was September 1962. I was late for my first Math 120 class in Arts 100 so tried to enter the huge lecture hall without being noticed. Dean Walter Gage, who had already begun his lecture, stopped

and asked me if I was lost. I was so nervous that I could not answer.

"This is Math 120, son. Are you in this class?" he asked.

"I think so," I replied timidly.

Pulling out the class list, he asked, "name and student number?"

I managed to choke out: "Wilson, William Lane, 94621621, Sir."

"Wilson?" he queried. "Are you a Native Indian, William?"

I was one of the few Native Indians at the university at the time. My brothers and sister had gone before me, but I felt very much alone, especially standing before the famous math teacher.

"Is Reginald Wilson your brother?" he asked.

"Yes sir," I replied, near tears.

"Then Cal and Donna must be your brother and sister, right?" the Dean asked smiling. "Well, William, if you are even half as bright as your siblings, you will be a great contribution to this class. Now find a seat and with your permission I will continue with the lecture."

In one brief moment this great man made me feel comfortable in a totally intimidating environment. I was fortunate enough to meet with him many times later, and even be one of many to whom he would lend money to "get by." It was a seminal moment in my life.

(Bill is the father of Canada's new Justice Minister, Jody Wilson-Raybould. See page 28)



Dean Walter Gage giving a lecture.

MICHAEL MORRIS, BArch'73

I was one of the few lucky students who participated in the very unique (and never to be repeated in such a fashion) "workshop" that the School of Architecture ran in August of 1968. Some say that it was a sociological study and we students were the specimens being experimented with. I never found out the whole truth. We were dropped off on a deserted island without food and shelter for over a day, we slept on a glacier, we toured a McMillan Bloedel plywood factory on Vancouver Island, we lived in an old brick kiln south of the border, and we spent a few days in the east end of Vancouver, sleeping in a seedy hotel. I was a young very straight and proper fellow from London, Ontario, a city where drugs and hippies were completely foreign, and I was thrown into the adventure of my life. It was truly an extraordinary experience, one that will stay with me forever. My first day at the school saw me wearing a tie, dress pants, and a sports jacket. I was the only one in such "business" attire. After the workshop, I wore jeans, started growing a beard, and realized that a whole new world had been opened to me. That first month changed my perspective on life and I will forever be grateful to the men and women at UBC's School of Architecture for giving me such an incredible gift!

JON PEARKINS, BSc'74

It (almost) felt like cheating when:

- Three of us did the same group project for four different computer science courses over two years.
- Four novels were assigned reading for English 100, but I had only read two. The final exam was a choice of two essay questions from four, one on each novel
- I wrote essay answers to all questions of a third year Math course, each of which

began "If I knew the formula, here is how I would solve this problem..." I passed the course.

MARGARET PARLOR (NÉE MATHEWS), LLB'76

I was a law student and dad was a geology prof. Two of my friends were in his course. They invited me to go with them to their 8:30 class, and we settled in the back corner. Dad started lecturing. He was showing slides of geological formations, and one showed a little boy sitting on a rock. About that time, he noticed me. Without missing a beat he announced that "the child in the photo is my daughter's brother," and continued on. The three of us at the back had a good laugh while the rest of the class scratched their heads wondering why he'd said that.

HUGH LAIDLAW, BA'76

The Ridington Room – the humanities reading room once comprising most of the Main Library's North Wing – is gone now. It has been replaced by some ultra-modern design whose architectural aesthetic fits the remaining part of the old library like a grass skirt on an octogenarian.

Maybe I'm biased, but I've such fond memories of studying in the now-departed portion, with its high windows, chancellors' portraits, and ample resource materials. Unlike the elevated noise levels of the study areas of Sedgewick Library, the Ridington Room was the quiet haunt of students seeking undisturbed study. There were three regular students using it during my time: me, a guy in a ponytail and cowboy boots, and a co-ed with glasses who always wore a skirt. As I began to think about graduate studies,

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Robert H. Lee Alumni Centre

I found myself spending more and more time at the shelves near the west door; these held the course catalogs of other universities. I loved UBC, but I had a real itch to travel and had promised myself that I would go to a place where I didn't know anyone. I decided on the University of Toronto.

The Friday after I arrived in Toronto, I was seated with two of my new classmates when a third classmate approached with another female student. "Hi guys," she said, then turned to her companion. "This is Deirdre from my residence, who's doing her master's in English." What was going through Deirdre's mind when she looked at me? "Him again! The guy from the Ridington Room!" We began dating that December and were married a few years later. I don't like the look of the new attachment to the Main library, but maybe that's because I have such fond memories of the old Ridington room, the place on campus where I almost met my wife.

FRANCO DEPIERI, BAsC'77

By the second week in Okanagan House, when all the students had moved in and the parents who helped us were gone, the patterns of daily life began to emerge. Part of this was the trek to the cafeteria for dinner lovingly prepared by the cafeteria staff under the watchful eye of "Fang" the dietician. The trek was punctual so as to occupy the table with the best vantage point for observing the female half of the residential campus. On occasion, a display of displeasure with the menu might occur; one instance resulted in a large pyramid of inedible fishcakes.

MARGARET LOUISE STINSON, BEd'78

In the summer of 1961 after my first year of teaching, three other young Saskatchewan teachers and I decided to venture to UBC summer

school. We were housed in Fort Camp, old military buildings, for the duration of our stay. After a day of classes we would arrive back to our Fort Camp residence and head to the foot baths that we so appreciated and used daily – until we mentioned this habit to one of our male friends. He dissolved into fits of laughter and informed us that these foot baths were in fact urinals! Our building had housed servicemen years before. I have never lived down being an innocent and naive prairie girl. Of course, having married the male friend, I expect I never will.

CHARLES CARTER, BA'79, DipEd

It rained some nights when I trekked back to B-Lot, and I vowed to get a coveted C-Lot sticker someday. On some of these dark and stormy nights, I would digest my thoughts in the belly of Sedgewick library. At one of the many group tables, enclosed private smokers would puff away in relative peace and quiet, perhaps reflecting upon a Hemingway elephant, a bored Salinger shrug, or a Chaucerian tour de France romance. But this covert sanctuary slowly gave way to a new found chasm of memory loss for this newbie. If it was a wintery Wednesday night, the PIT (no chrome) swallowed me up. Here I played Pong, Pacman, and Foosball on beer bets. And from the one television on the wall over the bar, Howie Meeker analyzed the Canucks' great plays during Hockey Night in Canada while misty blue cigarette smoke drifted cancerously past the screen and mingled with the fetid odor of Old Style Pilsner. The PIT was our dark cave, man, with the sounds of Trooper, Genesis, or The Guess Who helping us to pound back the sudsy angst of not finishing another assignment on time. (But very well re-edited and proofread considering the dim lighting.)

JASON BOSHER, BSc'85

This is a 2014 photo of me standing in front of a lab in the Geology building. The significance of this photo is that I lived in Surrey during my time at UBC. There was no SkyTrain and I had to commute by bus. I spent four hours a day on the bus, thus negating any study time (I always had to stand). Living at home, I didn't receive much of a student loan. Fortunately I received a work/study grant via Dr. Danner. I worked in his lab (the one in the photo) making thin sections of rock for studying under a microscope. I squeaked through 2nd year, but knew that the commute was killing me. So for my 3rd and 4th year in geology, I "lived" in the lab. There was a couch that I slept on and I kept UHT milk, a kettle, instant porridge, instant soup



Jason Boshier outside his former lab and second home.

and peanut butter under a fume hood. I showered in the basement. I went home every Tuesday to do laundry, buy food and watch the A-Team. The rest of the week I was in the lab working or studying. This less-than-ideal situation paid off as I graduated with good grades. If it wasn't for Dr. Danner and that lab, I don't think I would have made it through four years of university.



HEATHER COLE, BSc'91

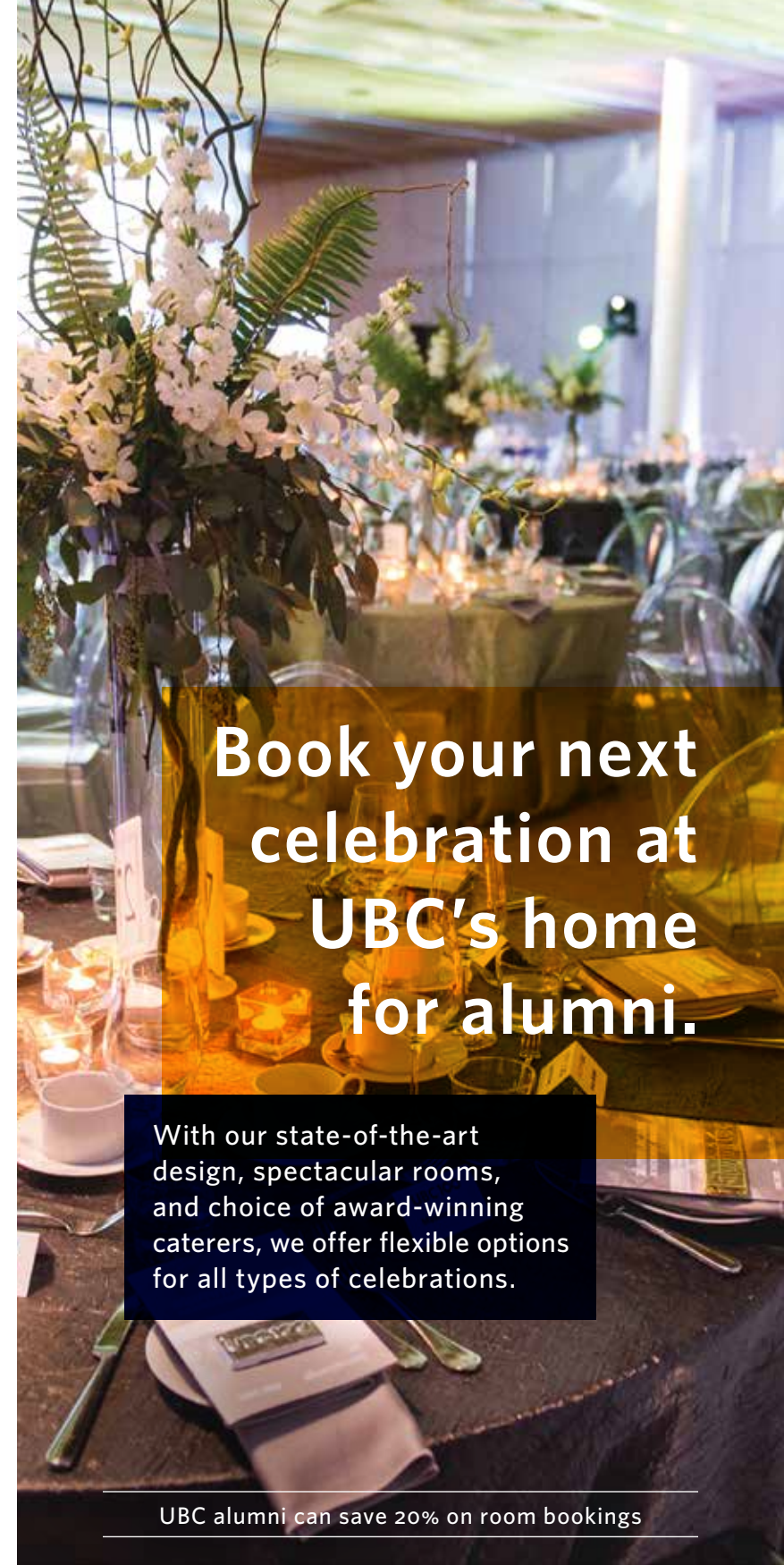
I hope every student has a mother who loves them as much as mine loved me. After four years of hard work, good times and meeting life-long friends, I was graduating. My mom was walking down the stairs at the bookstore, where I had to pick up my cap and gown. Her heel got caught in the pebbled surface of the stairs and she fell, scraping up her leg. A bunch of people rushed over to help, including the safety officer on the construction site for the biotechnology building, ice pack in hand. Everyone was asking if she was okay and the first words out of her mouth were: "Where can I get a new pair of panty hose? My daughter is graduating this afternoon!" Bless the ladies from the bookstore – new panty hose were purchased, some bandages applied and my mom was ready to see her kid – the first in our family – graduate from university.

"It was very early on the Monday morning of UBC's Campus Nursing Week – a week that included the T-cup Football Game and Chariot Races. As UBC Nursing Undergraduate Society President at the time, I ensured our Nursing 'mark' and week was known on campus." (Kris Gustavson (née Cholyk), BSN'86, MSN'01)

One of several engineering cairns contributed to the Vancouver campus landscape by UBC engineering students. Photo submitted by John Reche, BAsC'71, MASc'73: "I think this was 1969. This 'construction' disappeared mysteriously and was replaced the next year by a much larger and heavier structure."

HEATHER HASTIE, BA'93, BEd'95

My grandmother (Eleanor Wright, née Butler) was actually one of the first women to go to UBC in the 1920s. She studied music, but I'm not sure that she actually graduated. She was 70 by the time I was born, and she lost her sight due to macular degeneration by the time I was five, so I had always known her as a non-sighted person. After a year as an exchange student between high school and university, I ended up going to UBC. My first trip back home to Vancouver Island was at Thanksgiving, and my grandmother was very interested to hear all about my new experiences. She started asking me questions: was the Math Building still covered in ivy? Was it going all red right now? Had I been down to the beach and looked across to the island? Then her questions expanded to whether I had been up Seymour Mountain, and did I like the view from the 2nd pump? I was blown away, because I had never considered this aspect of her before – that she had been a fully-sighted person for most of her life, and she had sighted memories that we could share. My grandmother had a tenacious spirit that was reflected in everything she did. From being one of the first women to go to university (and drive and own a car in that era) to being heavily involved in the Girl Guides program and setting up the program in Japan after WWII, to living to be almost 101 in her own house by herself even though she had lost her sight 25 years earlier. She was an amazing lady and a feminist long before that term gained meaning, and I'm sure UBC had an impact on the way she lived her life.



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ANA-MARIA GIDOFALVI, BSc'99

My third year in university was definitely a year filled with surprises. I'd just moved to family housing (with my husband and my three-year-old daughter) and as I was learning to balance studying and family life, I discovered, to my surprise, that I was expecting again. The next surprise came with my first ultrasound exam, when we were informed that we were going to have twins - double the joy! My classmates were extremely supportive: they catered to my sugar cravings by providing me with an endless supply of my favourite chocolate bar (until I was diagnosed with gestational diabetes) and they kindly planned and organized a surprise baby shower for a Saturday morning in May. The surprise was theirs, in the end, as I went into premature labour and welcomed my twin sons on that very morning. One of them has now returned to his birthplace to study for a bachelor of commerce degree at the Sauder School of Business.



Twins - double the joy!

MARGARET SHAMRO (NÉE BRIGHT), BSN'06

The day had finally come. We had trained for months for this one game. They called it the "T-Cup." It was a full-contact football game between the UBC Nursing students and Rehab Sciences and it had happened once a year for as long as anyone could remember. Our team (UBC Nursing) was tired. We had snuck out of our dorms the night before to desecrate (or decorate, depending on who you ask) that famous engineering "E" with some "N"s in honour of our big game. Nevertheless - we were ready. Our faces were painted. Our helmets were on. It might have just been all the extra shoulder pads - but we felt tall. Strong. Ready. The side of the field was littered with spectators cheering us on: some polite and



"We love phenomenology. This was me and my best friend Luisa Braun, BSN'10, paying close attention in a population health lecture." (JoyAnne Krupa, BSN'10)

enthusiastic nursing students and some not-so-polite and even-more-enthusiastic engineering students. When that first whistle blew, we took off running. We tried our best to follow the plays that our Varsity Football coaches had developed for us. We tackled and ran and threw and caught, but after half-time the game was still 0-0. The crowd was anxious for some action. Now there were only minutes remaining to the game. Rehab Sciences had possession. We were on defense. When that ball was snapped I ran with all the strength and might my 5'0 frame would allow and I tackled that quarterback just as the football left her hands. My teammate intercepted her failed pass and then stopped dead in her tracks. The yell from our coaches started softly but grew as they realized what had happened, "RUN! RUN, BEAST, RUN!" And she did. She ran all the way to the end zone and scored the winning touchdown. We had just won the T-Cup! The crowd went wild. Engineers dressed in feather boas rode around victoriously in a homemade chariot. Nurses screamed. Coaches clapped. Kegs

KEITH MARTIN, BSc'10

I was at UBC for six years, and each spring I watched Storm the Wall but never participated. I have a neuromuscular disorder that has weakened the muscles in my body, and will continue to do so. As a student I could cycle reasonably well (running or swimming were not an option), but I never believed I could make it up the wall. I cannot lift my arms above my shoulders, much less pull myself up a towering 12-foot barrier. It was a mental hurdle as much as a physical one. I couldn't bear the thought of being a handicap to a team, so I never reached out to others. As much as I wanted to, I felt participating just wasn't for me. In the spring of my last year, friends approached me to join their team. I was excited, but hesitant. Surely they must realize the disadvantage we would be at? How would they lift me up? And I wasn't that fast on the bike! They rebuffed each negative thought - they wanted me on the team, and we would make it happen. I got my road bike in shape and trained. If nothing else, I could be fit for my bicycle segment (and a few pounds lighter for my teammates). I practised the cycling circuit along Main Mall, even crashing once from a loose handlebar. When the time came, I was ready for what may come. I don't remember our times, or how many heats we were in, or much about the races. But I do remember the feeling of storming over the wall every single time! It was a huge relief for my heart and my mind. I am so grateful to Amanda, Erin, Graham, and Oliver. With their help I not only hurdled the barriers I saw before me, I was reminded that I had no reason for doubt in the first place. Thank you for helping me overcome that wall within me.



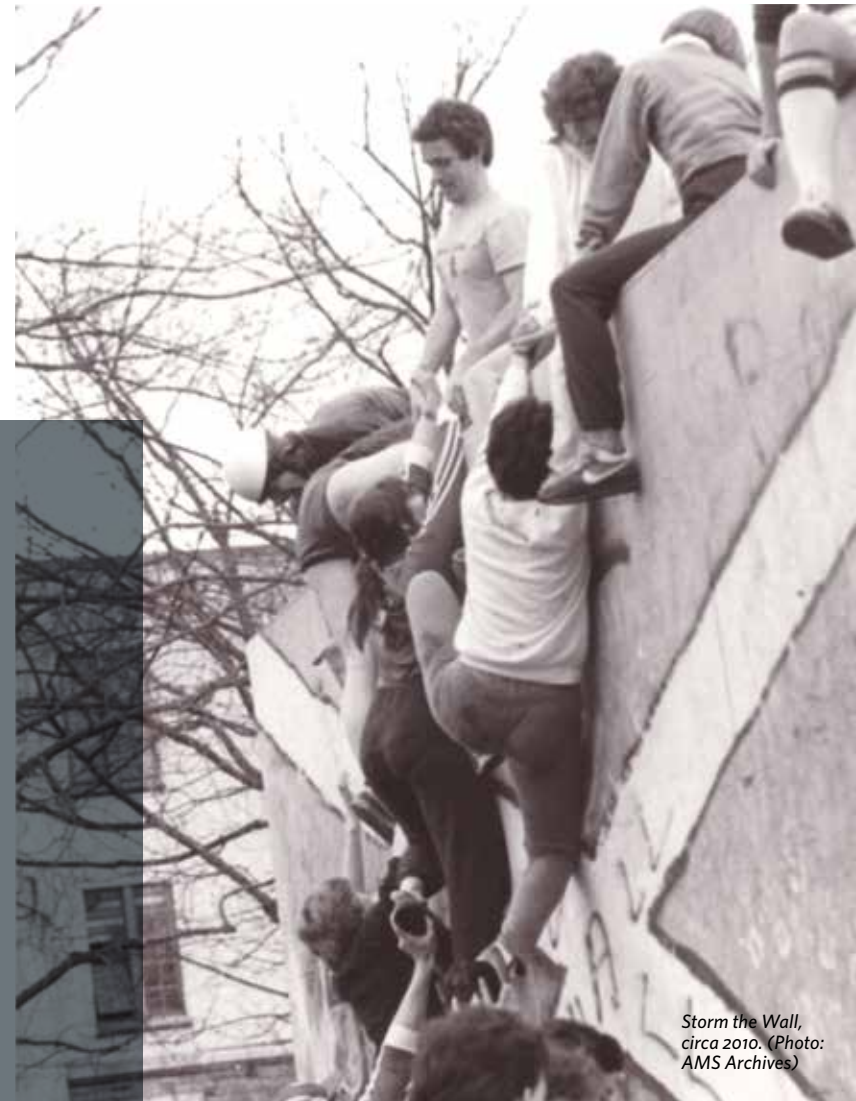
Tally Renee Davis, BA'13, sleeps under coats at the library after an exhausting night of study.

were tapped. We huddled up and held that trophy (an actual tea cup) high and proud. I can remember so much about my time at UBC and my wonderful experiences as a student nurse. But this moment - the teamwork, the mud, the grass, the bruises, the cheering - is a moment I will remember and cherish forever.

KENT SU, BA'13

Professor Glen Peterson gave the class a 14-page take-home assignment on China's Cultural Revolution. My girlfriend, Tally Renee Davis, BA'13, and I decided to complete the assignment at Irving library. It was exam season, so the library was filled with students who were scribbling fiercely on their notebooks, eating

leftover pizza, napping on desks, shuddering nervously with their coffee cups, or playing StarCraft to avoid studying. By 1:00 am, the majority of students were trudging their way to the exit. An hour later, only the two of us were left in the library. We genuinely enjoyed this beautiful tranquillity. Time seemed to cease to exist. I remembered William Faulkner's quote on time: "Clocks slay time... time is dead as long as it is being clicked off by little wheels; only when the clock stops does time come to life." We did not talk to each other. We simply transported our minds to the late 1960s when Mao ZeDong mobilized the Red Guards. The moment we realised what time it was (5:00 am) we began to feel groggy and lethargic. Tally desperately needed to lie down and nap, and I snapped a photo of her lying on the couch with both of our coats as her blanket. It illustrates our dedication and perseverance (we both earned our first A+ as a result).



Storm the Wall, circa 2010. (Photo: AMS Archives)



The Mining Engineering co-ed long boat team, sent in by Naomi Tweddle, BASc'07: "My first taste of this event was when I joined my Totem Park floor team in first year and I participated every year after that. It is a great break from school work and a chance to get outside and enjoy the city of Vancouver."



Pictured is Virginie Fostroy, BA'14, from Costa Rica: "In my first year at UBC Okanagan in 2011, I was a part of a group of students that created the first annual cultural fashion show, Rejoice. It's now in its 5th consecutive year and has become a signature event for the Okanagan campus."

UBC ALUMNI ASSOCIATION 2016 ANNUAL GENERAL MEETING

SAVE THE DATE

Thursday, 15th September, 2016

Robert H. Lee Alumni Centre
6163 University Boulevard
Vancouver, BC V6T 2Z1

Further details will be on our website soon.

GOVERNANCE/NOMINATING COMMITTEE SEEKS RECOMMENDATIONS

The alumni UBC Governance/Nominating Committee is seeking recommendations for alumni nominees to serve on the organization's Board of Directors. In particular, the committee seeks candidates who have the skill sets and experience necessary to effectively set strategic direction, develop appropriate policies, and ensure alumni UBC has the resources necessary to effectively fulfill its mission and vision. Please send suggestions to Ross Langford - Chair, Governance & Nominating Committee, c/o Sandra Girard, manager, Board Relations, 3rd floor - 6163 University Boulevard, Vancouver BC V6T 1Z1 / email: sandra.girard@ubc.ca no later than June 20, 2016.

Blue Wildebeest undertaking the great Serengeti migration.

Beyond the Bucket List

WITNESS THE GREAT MIGRATION

alumni.ubc.ca/travel

Indulge your curiosity as we take you to unique places you've always dreamed about. With UBC experts and knowledgeable local hosts, you'll connect with others and enhance your knowledge of the cultures, cuisines, and landscapes you're exploring.

Book your 2016/17 travel or join our mailing list to learn about future opportunities.

"The wildlife is thriving; the landscapes are stunning."



Observe the "Big Five" and learn about the Serengeti's modern conservation challenges on safari in Tanzania with researcher **Greg Sharam, MSc'97, PhD'05.** FEB 06-17, 2017 (12 DAYS)

Embrace the mix of tradition and modernity in Taiwan's culture with local art consultant **Susan Lahey, MA'94.**
APRIL 16-27, 2017 (12 DAYS)



Explore Cuba's scenic countryside and historic cities with sustainable agriculture expert **Wendy Holm, MSc'74.**
MAY 1-8, 2017 (8 DAYS)

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TWO NOVEL APPROACHES TO STUDENT HOUSING

STUDENT HOUSING ON UBC'S VANCOUVER CAMPUS

\$1,000

Average monthly rent on Vancouver campus: (range is \$633 to approx. \$1600 across the system)

6,300

of students on housing waitlist at its peak in summer 2015

\$500m

Amount UBC is investing in campus housing for 4,300 new beds (2010 to 2020)

9,400 # of residence beds at start of 2015-16 academic year

11,050 # of residence beds at start of 2016/17 academic year

12,500 Proposed # of student residence beds by 2020

13

Current # of residences, including Acadia Park Family Housing

GROWTH IN NEXT TWO YEARS:

2016 Orchard Commons: 1,049 beds (1st year students)

2017 Totem Park Residence In-fill: 355 beds (1st year students)

2017 Brock Commons, Phase 1: 404 beds (upper year / graduate students)

2019 Gage South: 650 beds (upper year / graduate students)

Gage South Student Residence will include 70 Nano suites.

140 square feet of student living

By Alison Huggins

Roughly the size of a parking space, yet with all the basic amenities of a full-size apartment, the Nano is a micro suite intended to help address the demand for affordable student housing on UBC's Vancouver campus. In an innovative pilot program, 70 such suites are being included in the planned 650-bed Gage South Student Residence. When the building is completed in 2019, the Nano suites will rent for around \$700 per month.

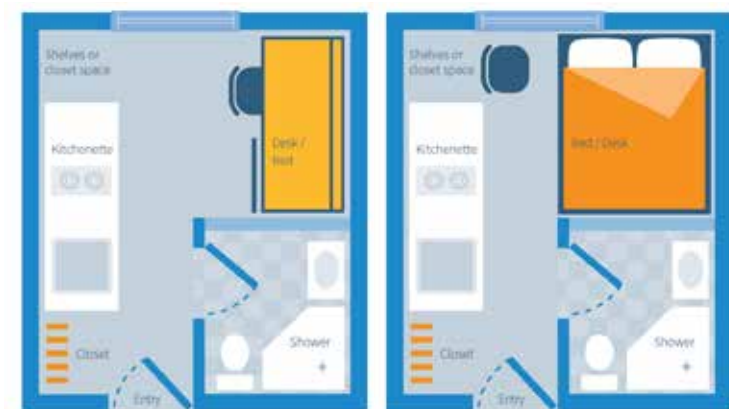
Although tiny, the self-contained Nano has a full bathroom, kitchen, storage space and a study/sleeping space with a work desk that transforms into a bed. It's a bit smaller than a single traditional dorm room, but, unlike a dorm room, there's no "sharesies" - it's 140 square feet of independent living. UBC sought input from students and worked closely with the architecture firm DIALOG throughout the design process.

While the Nano may not be for everyone, it was well received by students who toured the full-scale mock-up on display earlier this year at the AMS Nest, says Andrew Parr, managing director of Student Housing and Hospitality Services. "What we've seen from the survey results is a huge level of acceptance among students to live in an environment like that, for that price."

With apartment vacancy rates throughout the Lower Mainland at less than one per cent, finding an affordable rental in Vancouver - let alone one close to campus - is a significant challenge. Apartments in the same price range as campus accommodation are about a 45-minute commute away, says Parr. UBC already has the largest on-campus residence in Canada and, unless the current housing situation in Vancouver changes, the demand for student housing on the Vancouver campus is likely to remain high.

The Nano project is part of UBC's ongoing commitment to meet the demand. The university's investment of \$500 million dollars over 10 years will result in a total growth of 4,300 beds. "I know there's no other university in Canada that's investing in housing like we are," says Parr, who believes this commitment illustrates how UBC is listening to students' demands and working to meet them, not only through its investment in housing, but also through the types of housing on offer.

For a virtual walk-through of the Nano suite, visit www.vancouver.housing.ubc.ca/rooms/nano/



THE NANO



A full-scale mock-up of the Nano suite was on display earlier this year at the AMS Nest. (Photos: Sam Pat)



West elevation of tower



BROCK COMMONS STUDENT RESIDENCE

WILL BE THE WORLD'S TALLEST WOODEN BUILDING

What, Where, When

- 18-storey wood and concrete hi-rise (174 feet/53 metres)
- 272 studios and 33 four-bedroom units (404 students)
- Site: Walter Gage Road, between Brock Hall and Gage Residence
- Completion: Summer 2017 (Budget: \$51.5M)

Design & Structure

- The innovative design capitalizes on advances in wood technology and manufacturing.
- Hybrid structural system: one-storey concrete podium, two concrete cores, and 17 storeys of mass timber. Vertical loads are carried by the timber structure, while the two concrete cores provide lateral stability.
- A key mandate for the project is to demonstrate an economical structural system using wood and concrete that is comparable in cost to that of traditional concrete and steel structures.

Safety

- The design of the structure will be the first in BC to meet the new seismic design requirements under Canada's National Building Code.
- At three times the current height limit permitted by the building code for wood buildings, the structure required a Site Specific Regulation (SSR) from the BC Building Safety & Standards Branch. This process included peer reviews involving panels of leading structural engineers, fire safety experts, scientists, UBC building authorities, and firefighters.

Sustainability

- Wood is a sustainable and versatile building material that stores, rather than emits, carbon dioxide. Carbon stored in the mass timber structure, plus avoided greenhouse gas emissions from construction processes using steel and concrete, will result in a total estimated carbon benefit of 2,563 tonnes of CO₂, which is equivalent to taking 490 cars off the road for a year.
- The building will connect to the UBC district energy system and is projected to achieve up to 25 per cent energy savings over a typical building of the same use.
- The project is aiming for (at minimum) a *LEED Gold certification (*rating system for environmentally-friendly design and energy use).

Source: Acton Ostry (architects)



Southeast view



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THE LAST WORD WITH WILLIAM SHATNER

What is your most prized possession?

I hesitate to possess anything. There are many things I love to be with but possession is not in my vocabulary.

Who was your childhood hero?
Albert Einstein.

Describe the place you most like to spend time.
With my horses.

What was the last thing you read?
Riding Between the Worlds: Expanding Our Potential Through the Horse by Linda Kohanov

What or who makes you laugh out loud?
My grandkids.

What's the most important lesson you ever learned?
Nobody knows anything.

What's your idea of the perfect day?
Sun, sea, snow, equines and family.

What was your nickname at school?
Toughie.

If you ruled the world, what's the first thing you'd change?
The tectonic plates.

What item have you owned for the longest time?
My soul.

Whom do you most admire (living or dead) and why?
Alexander the Great - for his statesmanship, and because he was a warrior philosopher.

Whether or not you're a Trekkie (and yes, we're referring to *Star Trek* - this magazine has yet to inspire a cult following), you have to acknowledge that Captain James T. Kirk of the Starship Enterprise is part of our cultural DNA.

Originated by William Shatner in 1966, the playfully shrewd Captain Kirk is the actor's most iconic role to date, but Shatner's expansive acting resume also includes a mid-80s stint playing no-nonsense street cop T.J. Hooker in the TV show of the same name, and his Emmy-winning role as eccentric lawyer Denny Crane on *The Practice* and *Boston Legal*. Non-fiction credits include one-man-show *Shatner's World* and *Shatner's Raw Nerve*, an intensely up-close-and-personal celebrity interview series.

Shatner's pursuits are not limited to the stage and screen. He has also found success writing books (more than 30 of them), recording music (speaking the lyrics rather than singing them is his trademark style), and riding and breeding champion horses (American Saddlebreds in particular).

His 2008 autobiography, *Up Till Now*, was a *New York Times* best-seller, as is *Leonard*, his latest book recounting his friendship with Leonard Nimoy. His popular album *Has Been* (2004) inspired the Milwaukee Ballet's *Common People*, a dance presentation set to several numbers from the record. Shatner is also a philanthropist, once selling his own kidney stone to raise funds for Habitat for Humanity, and spearheading for many years the annual Hollywood Charity Horseshow, which raises money for programs to support handicapped children - often through therapeutic interaction with animals.

Shatner's diverse and fruitful repertoire is perhaps down to his willingness to take on new challenges and boldly go where he hasn't gone before. He is continually learning. Unlike those who suppress curiosity in favour of security, Shatner embraces it and stresses the importance of living a life driven by curiosity.

At *alumni UBC's* Centennial close event *UBC100: What's Next?* (see page 3) William Shatner will talk about what it means to live with a spirit of curiosity and will share stories about the fascinating places his curiosity has led him, and the possibilities that await us if we follow our own.

Follow Shatner on Twitter @WilliamShatner

What is your latest purchase?

A really nice car.

If you could invent something, what would it be?

A device that takes all the greenhouse gases out of the atmosphere.

What would you like your epitaph to say?

This is not my favourite place.

In which era would you most like to have lived, and why?

This present era is perhaps the most exciting in the history of man.

What are you afraid of?

A bad death.

Actor, director, author, singer. Is there anything else you'd like to try?

Holding my breath under water for four minutes.

Which three pieces of music would you take to that desert island?

An album called *Has Been*, an album called *Seeking Major Tom* and an album called *Ponder the Mystery*.

What is your pet peeve?

These stupid questions.

What's the strangest fan encounter you've ever had?

I was in a hospital room, coming out of sedation, and a man came in the door with no shoulders. Apparently I hallucinated.

What's the best thing about being an actor?

Entertaining people.

Apart from the essentials for life, what can't you do without?

Love. 

Build dreams



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At UBC we embrace our past and look forward to the future. Former student Cecil Green donated Cecil Green Park House (1912) to provide a unique venue for the wider community, including alumni. Now the university and alumni UBC have come together to create a new home for our 300,000 alumni and visitors to connect with each other and the campus. The Robert H. Lee Alumni Centre is a gathering place, physically and virtually, for continued learning, for entrepreneurship and for mentoring the next generation of students and alumni. Step by step we are building on past and present innovations. The UBC Centennial celebrates thinking that moves us all towards a better future.

SEE WHAT'S NEXT AT UBC100.CA