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FROZEN FRAMES

PAGE 2

THE RING

JANUARY 2020

The University of Victoria's community newspaper

ring.uvic.ca

University of Victoria

SPEED READ

VIDEO CONTEST

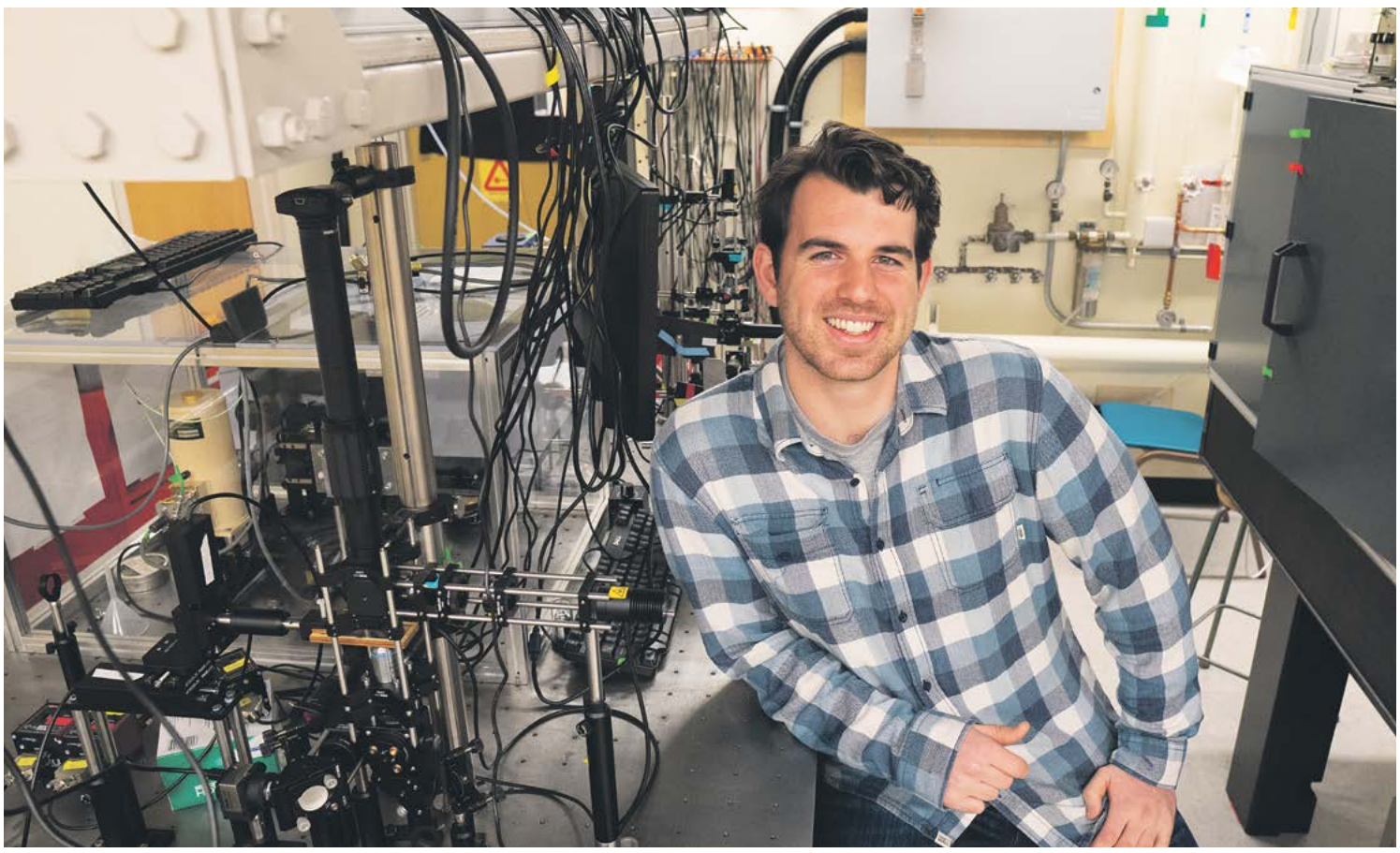
Research Reels

The fourth annual juried Research Reels video contest is underway. You can submit a short video (one to three minutes) of research you're doing to the Research Reels website at *uvic.ca/researchreels*. If selected as a finalist, your piece will be screened at Cinecenta during Ideafest on March 2. The first-place prize is $2,000. Submit your research story by Feb. 18.

REACH AWARDS

Nominate a faculty member

At the core of UVic's research and teaching excellence is a commitment to the fundamental value of freedom of inquiry. Reach Award recipients exemplify this commitment. Nominate a faculty member for a research or teaching award by March 2. Learn about the categories and access nomination packages: *bit.ly/20-reach*.



Hills in chemist Dennis Hore's lab, Dec. 2019. PHOTO: JENNIFER KWAN

11

NUMBER OF UVIC STUDENTS SELECTED AS RHODES SCHOLARS SINCE 1980

Biochemistry student named 2020 Rhodes Scholar

BY JENNIFER KWAN

Growing up on the West Coast, surrounded by the smell of pine and ocean spray, UVic biochemistry student Rory Hills developed a love for science early in life, driving his steady desire to help solve society's toughest problems—including the opioid crisis and climate change.

Because of his superior academic achievement and leadership, Hills is headed to the UK in the fall as a Rhodes Scholar based at the University of Oxford. "I could barely speak when I found out. This scholarship opens so many doors that might otherwise be shut," says the 23-year-old honours student.

A responsibility to make change

As a teenager, Hills recalls when UVic climate scientist Andrew Weaver gave a talk about climate change at his school gym. "He told us that we not only had the ability to make change, we had a responsibility to strive for it," says Hills, who recognized then that science is the vital link to help people understand and solve many of the world's problems.

From high school onward, Hills volunteered with the BC Greens. In 2015, Weaver, of UVic's School of Earth and Ocean Sciences, became leader of the BC Green Party and Hills later served as director of communications during Weaver's 2017 re-election campaign. "Every day, I got to work towards a vision of a government that put evidence at the centre of its decision-making process," says Hills of his experiences.

SEE HILLS P.6

UVic grads among the world's most employable

Graduates from UVic are among the world's most employable, according to a prestigious international ranking by Times Higher Education (THE).

THE's 2019 Global University Employability Ranking report identifies UVic as the best Canadian comprehensive university in preparing its students for the workplace, based on feedback from top international companies. Only nine Canadian universities made it into the international ranking, which was released in December.

UVic prioritizes dynamic, hands-on learning as a core focus of its student experience, with research-enriched experiential programming that includes co-operative education (co-op) work terms, practica, internships, field schools, international exchanges, community service learning, research opportunities and more.

Three-quarters of UVic co-op graduates receive an offer of employment before they graduate, often returning to work for a former co-op employer in a full-time role.

"Students tell us that the hands-on work experience they gain at UVic is transformative," says Andrea Giles, acting executive director of UVic's Co-operative Education Program and Career Services. "They apply what they're learning in class to solve real-world challenges, and in doing so, they develop confidence, connect with passionate professionals, and discover how they can positively impact the world around them."

Student participation in co-operative education at UVic is also on the rise, with 43 per cent of eligible students taking part. Co-op integrates paid work experience with employers into students' academic schedule. Last year, UVic co-op students completed 4,288 co-op terms with 1,350 different employer organizations around the globe, including 325 international work terms. Co-op is built right into programs for students in the faculties of engineering and business, and available as an option for students in most other areas of study across the university.

Google, Tesla, the Canadian Space Agency, Global Affairs Canada and Western Digital Thailand are among the diverse employers who hired UVic students for co-op terms in 2019. Google and Tesla also regularly hire UVic graduates—currently Google employs more than 50 UVic graduates, while Tesla has hired close to 20.

Here in BC, employers range from local small businesses to large-scale organizations. Companies such as AbeBooks turn to UVic to recruit new talent. Since 2011, the online book marketplace, which is a subsidiary of Amazon, has hired 84 UVic co-op students studying everything from software engineering and computer science to economics and global business. Amazon is likewise a long-time employer.

"AbeBooks has supported UVic's co-op program for many years, integrating students into our technology and business teams," says Arkady Vitrouk, chief executive officer of AbeBooks. "We take around 10 UVic co-ops each year and we are always impressed by their knowledge, skills and creativity. With around a dozen UVic alumni currently employed at AbeBooks, we appreciate having this institution on our doorstep."

Cross-campus strengths in THE subject rankings

In November, THE also released its 2020 world university rankings by subject, placing UVic programs in physical sciences and psychology among the Top 200 around the globe. These are in addition to previously announced Top-300 rankings for UVic in arts and humanities, computer science, and engineering and technology.

THE subject rankings comprise 11 broad subject areas that gather related disciplines together. For instance, THE's physical sciences category includes the fields of chemistry, geology, environmental, earth and marine sciences, math and statistics, and physics and astronomy.

ringers

Visual Arts undergraduate **Austin Willis** is one of 11 overall winners—and the only Canadian recipient—of the US-based International Sculpture Center's 2019 Outstanding Student Achievement in Contemporary Sculpture Award. Willis, a painter and sculptor due to graduate this spring, has been awarded the prestigious award for his piece, "Framed Landscape." All 11 award recipients will participate in a future exhibition, and have their work featured in the International Sculpture Center's award-winning *Sculpture* magazine.
bit.ly/20-frame

PICS Executive Director **Sybil Seitzinger** has been named the 2020 recipient of the A.C. Redfield Lifetime Achievement Award by the Association for the Sciences of Limnology and Oceanography (ASLO) for her vital work on nutrient biogeochemistry in aquatic systems, spanning molecular to global scales. Her contributions include watershed syntheses, cutting-edge regional and global analyses, and the development of novel methods that have opened up entirely new fields of study or facilitated the quantification of previously unquantified (or poorly quantified) processes. ASLO President Michael Pace says, "Sybil Seitzinger has throughout her career continually deepened and broadened her scientific perspective to make progress on key problems in research and in the application of research to pressing environmental issues. Her work is a testament to how scientists can both make great advances and have great impact." The award will be presented at the Ocean Sciences Meeting in San Diego, California in February.

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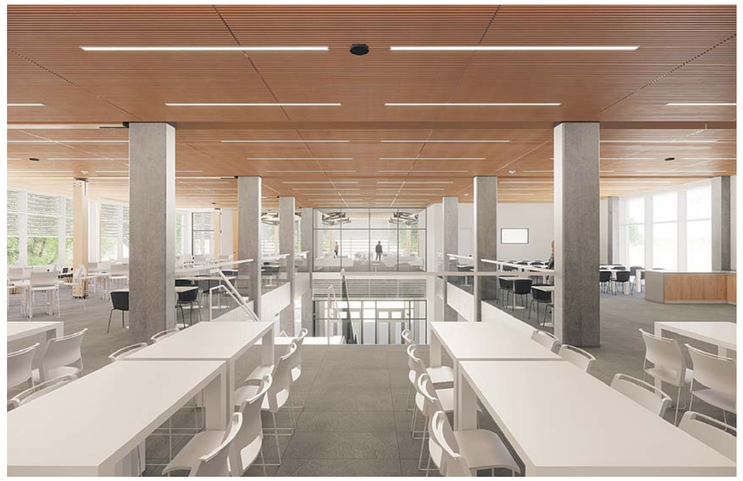
Student housing and dining project getting underway



Architectural rendering of planned second-floor dining area in Building 1 .

The new Student Housing and Dining Project will become more visible early in the new year, with construction preparation work beginning at the site.

"After almost two years of detailed planning, we are eager to be moving from the design phase into the construction phase of the project," says Director of Campus Planning and Sustainability Mike Wilson. "Although the major deconstruction work won't begin until next summer, the campus community can expect to see increasing activity at the site, and in parking lot B—where the modular dining facility will be located."

The two new student housing and dining buildings will be located outside of Ring Road south of the Student Union Building, and will replace the Cadboro Commons Building as well as Emily Carr and Margaret Newton residences. The project to create 621 new student housing spaces, plus a modern dining hall, classrooms and conference space, is the first significant capital project since the university's Campus Plan was renewed in 2016. Constructed to LEED Gold and Passive House standards, the buildings will offer traditional dorm rooms, and new "community-living" style rooms with a shared kitchen and living area.

Fencing at the main project site will be installed in January, and work to upgrade underground services to the new buildings will take place throughout 2020. Trees will be removed both at the main project site and in parking lot B. All trees removed will be replaced at a ratio of three to one elsewhere on campus, and where possible, wood will be re-used in the buildings or gifted to Indigenous communities.

Parking lot B—between the Bob Wright Centre and McPherson Library—will close in Feb. 2020 to prepare for the installation of the modular dining facility, which will replace the Commons Kitchen during the construction period. The facility will be installed over the summer and remain in place until summer 2022, when the new dining hall in Building 1 will open. All new housing, dining, meeting spaces and classrooms will be available by early 2023.

Spirit of place

In mid-January an Indigenous blessing ceremony will take place at the site, bringing together campus leaders, students and members of the Songhees, Esquimalt and W̱SÁNEĆ nations to show respect for the land and acknowledge the history of traditional territories where UVic resides. The ceremony will also honour the Elders who have guided the project team in incorporating Indigenous design elements and teachings.

Following UVic's Indigenous Plan, the project will include design elements that can educate the campus community about Indigenous history and culture. Building 2 will include an Indigenous student lounge, while creating other welcoming and inclusive spaces for both Indigenous and non-Indigenous students.

UVic is committed to the safety of faculty, staff and visitors. Please use caution and obey signs in construction areas. For updates and more information visit the project website at *uvic.ca/new-student-housing.*

Reflecting forward

Carmen Charette wraps up her term as VP External Relations

BY MARC CHRISTENSEN

After more than seven years as UVic Vice-President External Relations, Carmen Charette will retire from her position at the end of this month—but her enthusiasm for the university, its people and its partnerships is undiminished.

When asked to reminisce about what she and her teams have accomplished, she advocates for the wonderful work they do in the present and future tense instead. The horizon, she makes clear, is full of promise.

"I think we have an amazing community at UVic," she says, noting the opportunities made possible by the university's extraordinary range of partnerships, both on- and off-campus. "What I love about this place is the passion that the people we work with have—and their commitment to make this place the best it can be and make an impact."

Each one of the External Relations units holds her attention as she ticks off the importance and value, as well as their unique prospects. Those units include Alumni and Development, Ceremonies and Events, Community and Government Relations, Farquhar Auditorium, Legacy Art Galleries and University Communications + Marketing—and though each has its own distinct role, she guides the conversation back in every case to show how they support the core university purpose.

"At times," she says, "people will think of this entire portfolio as being eclectic and diverse, but when you think about what links all of these together, at the heart of it is that basic mission of connecting UVic and the world around it."

"What's fundamental to all of that is those relationships we build for mutual benefit. It's about the vision that we have to build a better future for people, places and the planet."

The pursuit of that future, as it happens, is what eventually draws Charette to use the past tense—though it's a very recent past. The 2019 Giving Tuesday celebration exceeded all expectations, with donations exceeding $167,000, and Charette is inspired by the stories of philanthropic generosity. "The stories that come through this fundraising event," she says, "are all about wanting to do something special and wanting to give back. And it's focused on our students, and supporting their experiences and growth."

"As we look towards the future, I would like to acknowledge the outstanding contributions Carmen has made to our university," says President Jamie Cassels. "She has brought boundless energy, integrity and commitment to her work and her leadership. Working alongside her talented team and colleagues, she has developed strong relationships, embraced opportunities and challenges and has advanced the university's vision, positioning us for an exciting new era. On behalf of the entire UVic community, I wish to thank Carmen for her extraordinary service."

As she prepares to pass the mantle to Chris Horbachewski next month, Charette reflects that when she came to UVic from SSHRC in 2012, "I'd spent almost 30 years working with universities, and it felt like a great privilege to go from the outside in, to come to this university."

Since then, Charette says, refining how we tell the story of UVic has been at the heart of our efforts. "What I'm most proud of is the work that our teams, working with our colleagues on campus and beyond campus, have done to really enhance the profile and reputation of UVic. And that cuts across the entire Division of External Relations." The evidence is hard to miss: on the UVic website, in the stories of our students and researchers, and in the university's publications and advertising campaigns.

Charette at a United Way plasma car race fundraiser. UVIC PHOTO SERVICES

She also cites strengthened relationships with all levels of government as contributing to opportunities like establishing the JID Indigenous Law program, and expanding oceans and climate research opportunities at UVic.

Community connections to both the Farquhar and the Legacy Galleries are also substantially deeper, with more Victoria Symphony performances and high-profile performers at the former and an array of new initiatives at the gallery that enhance accessibility and learning opportunities—for community audiences and UVic students alike.

Charette's decision to step away from the role is also, in its own way, tied to a vision for the future. "In these jobs, there's a time to come and a time to go. You have ideas about what you want to accomplish, and then you need to give the opportunity to other people to take it to the next level. It's an evolution."

"This team is in a good place, and I think they'll flourish under new leadership, building on the foundation we have now."

The marvellous memories will clearly stay with Charette, though. The range of extraordinary experiences she's been a part of have been great—from alumni gatherings and recognition and cultural events to gallery events that are bittersweet with the pursuit of reconciliation. And she carries those moments together with appreciation for donor-driven support for the still-unwritten stories of students and researchers to come. "These are all moments where you feel a sense of community and belonging—a sense of joy and good. And that's magic."

Frozen frames

Wildlife cameras capture a national award for grad student who documented human role in animal decline

BY ANNE MACLAURIN

Crawling through dense underbrush was just a normal part of Sandra Frey's day as a graduate student in UVic's School of Environmental Studies.

Last November, she received national recognition—the Mitacs Award for Outstanding Innovation in a master's program—for her breakthrough work with wildlife camera data collection.

Frey used the data collected from wildlife cameras to show how animal behaviour patterns change when people disturb their habitats, information that can ultimately be used as an early warning system to detect and prevent wildlife decline, and manage land-use policies.

"Normally when researchers are trying to understand the impact of human activity on wildlife," she explains, "we're looking for changes in species distribution, but by the time we detect it, there may already be significant losses in those populations."

By reliably detecting small changes in species behaviour due to human activity, she adds, the hope is to mitigate for biodiversity losses before they occur.

By examining large quantities of time-stamped images and related data, Frey documented subtle changes in animal behaviour in landscapes where human activity is present compared to undisturbed landscapes. Working under the supervision of InnoTech Alberta scientists Jason Fisher and Brian Eaton, and UVic ecologist John Volpe in the School of Environmental Studies, she used the information collected from remote wildlife cameras.

Focusing on several carnivore species including wolf, cougar, coyote, lynx, wolverine, marten and long-tailed weasels, Frey showed that important shifts in behaviour occur that could ultimately lead to species decline.

Frey is one of eight Mitacs award winners nationally this year, chosen from thousands of researchers who take part in the annual Mitacs programs. The remaining seven recipients were recognized for outstanding innovation, exceptional leadership or commercialization in other areas of research.

Mitacs is a not-for-profit organization that fosters growth and innovation in Canada for business and academia.

Frey with wildlife camera in Willmore Wilderness Park, AB. PHOTO: INNOTECH ALBERTA AND AB PARKS

Entrepreneurs get million-dollar boost from Coast Capital Savings

(L–R): Tracey Arnish, Coast Capital Savings chief member experience officer, Cassels, Orrego, and Kalynchuk. UVIC PHOTO SERVICES

Campus innovators and entrepreneurs will benefit from a $1-million funding boost to the Coast Capital Savings Innovation Centre (CCSIC) announced last November, that will provide students access to support, mentorship and financial skills required to contribute and thrive in BC's economy and beyond. The funding marks the largest philanthropic contribution given to a Vancouver Island organization by the BC-based Coast Capital Savings.

With partnerships underscoring UVic's Strategic Research Plan, CCSIC is a hub where students can experience hands-on learning in a work-integrated environment. The five-year funding agreement will help innovators and entrepreneurs develop business concepts from idea to investor-ready. This includes helping launch ventures, support business plan competitions and create co-op opportunities.

"Coast Capital Savings is an exceptional partner for our innovation centre and university," says UVic President Jamie Cassels. "This game-changing investment allows us to take learning beyond the classroom and research outside the lab. Our centre's entrepreneurs make significant impacts in our community and beyond."

The partnership with UVic reflects a key component of Coast Capital Savings' commitment to create a stronger community that will be more attractive to youth and to build a community culture that creates opportunities for them.

"Coast Capital Savings' community leadership mandate is to support youth in their pursuit of financial independence while building strong, vibrant communities," says Calvin MacInnis, president and chief executive officer of the federal credit union. "Our ongoing support of the Coast Capital Savings Innovation Centre at UVic is a tangible contribution to the future of the amazing young people who benefit from the centre's support as they pursue their entrepreneurial endeavors. These young people are the business leaders of tomorrow, the fuel for our country's economy and the innovation that bolsters the change makers of tomorrow."

Following a relaunch in 2016, CCSIC has supported more than 500 students from all faculties across campus and supported the launch of 70 startup companies. Roughly half of all program participants are from underrepresented groups including women, visible minorities and Indigenous Peoples.

Juan Orrego, co-founder and CEO of Cuboh, which offers online ordering, payment and delivery solutions for the restaurant industry, said the UVic innovation centre provided the vital support and resources he needed to think, plan and act more strategically about his venture.

"The innovation centre opens so many doors. They pushed me to dream big and then helped me—every step of the way—turn my ideas into action," said Orrego, 22, who is a graduate of commerce from UVic's Gustavson School of Business. Cuboh now has a team of more than 10 people and was a recent graduate from Y Combinator, a prestigious accelerator program in Silicon Valley. He was also listed in BCBusiness magazine's 30 Under 30.

CCSIC is part of UVic's Research Partnerships and Knowledge Mobilization unit within the Office of the Vice-President Research. The unit connects faculty, staff and students with external partners including industry, government, not-for-profit organizations and communities.

around the ring

Impact Fund 2020 call for submissions

The call for submissions for the Strategic Framework Impact Fund 2020 competition is now open. If you have an innovative idea that will advance the framework's priorities and strategies, please consider submitting a Notice of Intent. A total of $300,000 is available to be awarded annually. The submission form is due by Jan. 31, 2020. Visit the website for your copy of the form and to learn about eligibility, criteria and the selection process: uvic.ca/strategicframework/impact-fund/

Wondering if it's a "snow day?"

In the event of a major snowfall or other extreme weather event, check the UVic website for a link to current information about the status of campus operations. The university will use the website to let you know about safety precautions, service disruptions, class cancellations or campus closure. Information will also be posted on Facebook and Twitter. In the event of a campus closure, the UVic SafetyApp may be used to send messages to members of the campus community. Download the app for free from the Apple App Store or Google Play.

Victoria Hand Project extends its reach

TD Bank awards project $1 million to help amputees and kids in Canada and the US

BY ANNE TOLSON

Dechev. PHOTO: ARMANDO TURA

A UVic initiative that provides 3D-printed prosthetic hands to amputees in seven developing countries around the world will now be able to extend its reach to help people in underserved and remote communities in Canada and the US.

The Victoria Hand Project (VHP), led by mechanical engineer Nick Dechev, received a $1-million award by the 2019 TD Ready Challenge. UVic was one of 10 grantees announced in December by the TD Bank Group.

The new funding will enable the not-for-profit VHP to provide low-cost prosthetic hands to Canadian and American amputees, and also to initiate UVic research trials on new 3D-printed spinal braces designed to treat scoliosis (curvature of the spine) in children.

Over the next three years, the grant will fit 200 amputees with hand prostheses and 160 children with scoliosis braces. The funding will also enable VHP to build a network of partner prosthetic and orthotic clinics that will refer patients living in remote and underserved regions in North America.

"By leveraging new technologies and engineering design, along with our clinical partnerships, we are able to create health care technology that is accessible for many people who normally cannot afford this care," says Dechev.

Since 2015, VHP has provided low-cost, 3D-printed prosthetic hands, primarily in developing countries where access to prosthetic care is difficult and costly. The prosthesis helps amputees regain function, improving their quality of life and increasing their access to employment.

Dechev and VHP have begun testing a similar approach to developing a cost-effective 3D-printed scoliosis brace. It's estimated that about three per cent of all children develop scoliosis—90 per cent of whom are female. About 10 per cent of these kids will require a scoliosis brace to halt the progress of their spine's pronounced curve. If not halted with early intervention, scoliosis can lead to pain, deformity, and potential heart and lung damage.

A conventional scoliosis brace is molded plastic made with a very labour-intensive process, and fits like a corset around a child's torso. It may have to be worn for years. Such braces are not covered by the healthcare system in Canada or the US, cost about $5,000 per device, and require replacement at least twice during years of growth. This makes conventional braces unaffordable for many families.

Dechev and VHP use advanced tools such as 3D scanning and 3D printing to develop a customized brace that costs about $150 in materials and can be adjusted and reprinted in clinics with ease. Dechev says that compared to a traditional brace, the 3D-printed version takes about 10 per cent of the time to create, weighs about half as much and is much more breathable.

"This project is an amazing opportunity to raise the standard of scoliosis care for people in Canada and the US who live in communities that are currently underserved by specialized orthotics care and who are not able to afford the more expensive corrective devices to treat curvature of the spine," says Dr. Brent Weatherhead, orthopedic surgeon and Island Health's head of pediatric surgery.

"The Victoria Hand Project is an example of a scalable solution that will help increase equitable health outcomes for more children in Canada and the US," says Andrea Barrack, Global Head, Sustainability and Corporate Citizenship, TD Bank Group. "Being a winner of the TD Ready Challenge is a testament to the skill, ingenuity and vision of its creators, as well as their dedication to improving the health of their communities and opening doors to a more inclusive tomorrow."

The 2019 TD Ready Challenge encouraged organizations across North America to create innovative, high-impact health solutions for those who need them the most. In total, TD awarded $10 million for this year's challenge. TD targets $1 billion in total by 2030 towards community-giving in four areas—health, financial security, a more vibrant planet and connected communities.

Dual discoveries in chemistry published in *Science*

Two breakthroughs by UVic chemists published in *Science*

With many everyday products held together by adhesives, researchers from UVic and UBC-Okanagan hope to make everything from clothing and medical implants to residential plumbing stronger and more corrosion resistant thanks to a newly developed "hyper glue" formula.

UVic professor of organic chemistry Jeremy Wulff's research team led the design of the new class of cross-linking materials in research published in the journal Science last November.

The team of chemists and composite-materials researchers discovered a broadly applicable method of bonding plastics and synthetic fibres at the molecular level in a procedure called cross-linking. The cross-linking takes effect when the adhesive is exposed to heat or long-wave UV light making strong connections that are both impact-resistant and corrosion-resistant. Even with a minimal amount of cross-linking, the materials are tightly bonded.

The discovery, Wulff says, is already playing an important role in the the work of a team of researchers from UVic, UBC and the University of Alberta who are collaborating to create high-performance body armour.

"Micellar brushes" alter surface properties

If you can find an efficient way to alter the chemical makeup of a surface, then you can potentially enable a wide range of applications—from designing electrodes for powerful sensors to accessing improved ways to harvest energy for more efficient solar panels.

Researchers from Canada and China did just that in research also published in *Science* last November. Renowned chemist Ian Manners, UVic's Canada 150 Chair in Materials Science, and chemist Huibin Qiu of Shanghai Jiao Tong University, developed a new way to achieve functionalized surfaces. The process involves covering a material with tiny seed particles that, when mixed with solutions of polymers, result in the growth of nanoscopic crystalline fibres or "micellar brushes."

"The 'micellar brushes' that we grow from the surface are 10 to 100 times as large as other brushes such as polymer chains that have previously been attached to surfaces," says Manners.

The new method ultimately leads to the surface being covered with the tailored brush structure that allows surfaces to respond differently to liquids such as water and oil and to exhibit antibacterial behavior, as well as permitting chemical reactions using catalytic gold nanoparticles.

Manners joined UVic in spring 2018 and leads a team of 22 coworkers at his lab that focuses on advanced materials, which enhances the performance of existing materials and develops new ones for broad applications.

A rock-solid climate solution for CO2

Crawford, Moran and Seitzinger. MIKE MORASH / UVIC

International team works to advance technology that will turn a greenhouse gas into rock

Scientists now know that for Earth to stay within the temperature increase limit set by the Paris Agreement, negative emission technologies (NET), which remove and permanently sequester carbon dioxide from the atmosphere, are essential.

The UVic-led Pacific Institute for Climate Solutions (PICS) is bringing together an international team of experts to take on this challenge with a new four-year feasibility study.

The Solid Carbon project aims to permanently and safely sequester carbon dioxide (CO_2) as rock. The vision is to extract CO_2 directly from the air, then, using deep-ocean technology powered by ocean-based wind and solar energy, inject the CO_2 into sub-seafloor basalt, where it will mineralize into solid carbonate rock.

PICS executive director Sybil Seitzinger says if this ambitious project proves feasible, oceans around the world could be home to floating platforms that house this NET solution.

"Drastic reductions in greenhouse gas emissions are essential but not sufficient to combat climate change," she says. "The ultimate goal is to develop a commercially viable solution to support negative emissions by 2050."

Solid Carbon boasts an international team with researchers from Canada, the US and Europe, who bring expertise in ocean science, carbon mineralization, renewable energy generation, engineering design, and oil-and-gas drilling/injection operations. Also onboard are experts able to navigate the social and legal implications of emerging NET advances.

Over the next four years, the Solid Carbon project will assess the integration of six existing technologies in a way that's never been conceived of before. The best outcome will be selected for a real-world demonstration 2,700 metres underwater at an Ocean Networks Canada (ONC) observatory site in the Cascadia Basin.

"With nearly 10 years of operation in the deep sea, ONC's observatory team brings expertise that will provide close analysis of the CO_2 injection and mineralization processes and environmental monitoring of the overlaying sediments, seafloor, and water column," says ONC President and CEO Kate Moran, who is also Solid Carbon's principal investigator.

Another key component—direct air capture technology on land—was developed by Squamish-based Carbon Engineering over the past 10 years. "One key design challenge will be adapting direct air-capture technology used on land to perform reliably on a floating offshore platform powered by renewable energy," explains Curran Crawford, an engineering professor with UVic's Institute for Integrated Energy Systems. Crawford will lead the investigation into what ocean technology design works best for capturing—and then injecting—the CO_2 into ocean basalt. Prototypes will then be built for further evaluation.

So why chose an ocean location for this project? In short, because 90 per cent of the planet's basalt is beneath the ocean floor. When CO_2 is injected into porous basalt, a type of volcanic rock, it reacts relatively rapidly with minerals to form a solid carbonate—permanently removing it from the atmosphere. And by using the world's largest reservoir of basalt—the deep ocean—to incorporate and permanently store CO_2 as solid rock, the project will have an edge in expanding the use of the technology globally.

Another important aspect is ensuring that the venture has societal acceptance. A team from UBC will look at the social and regulatory needs of the project, including both a small-scale demonstration and a larger commercial-scale operation. That team will investigate the laws affecting offshore carbon capture and storage to ensure future projects are conducted in a manner that not only helps to mitigate climate change, but is also safe and environmentally responsible.

UVic's engineering faculty are experts in renewable energy and sophisticated monitoring and power systems, UVic's ONC operates world-leading ocean observatories that can deliver a demonstration project offshore of Vancouver Island, Carbon Engineering is a world-leading air-capture company, and UBC has an internationally-recognized research team on the interface of nature, humans, technology and policy related to climate.

PICS and its Solid Carbon team recognise both the enormous ambition of this project and its potential payoff for combatting climate change, if the technology succeeds. By leading this international project, British Columbia is showing it has the expertise, drive and know-how to be a pioneer in the emerging field of negative emissions technologies.

bit.ly/19-carbon

Indigenous exchange program receives national recognition

BY JOY POLIQUIN

UVic co-op student Lisa Schnitzler spent a term at RMIT University in Australia.

UVic's unique exchange that connects Indigenous students studying here with co-op work terms with Indigenous centres at Australian universities has received the Canadian Bureau of International Education's Panorama Award.

This national award recognizes innovation and excellence in the design and implementation of high-quality international programming that supports students' academic and extracurricular learning as well as capacity-building.

"We are proud of this unique program and of the extraordinary opportunities for learning that it provides to our students," says Andrea Giles, acting executive director of UVic's Co-operative Education Program and Career Services. "Students participate in a meaningful exchange of cultural and academic knowledge—these experiences are transformative."

World's first known exchange of its kind

As the first known exchange of its kind, the Indigenous International Work Integrated Learning Exchange Program was launched in 2015 through a partnership between the UVic's Co-operative Education Program and Career Services and the Office of Indigenous Academic and Community Engagement, with funding from the Queen Elizabeth II Diamond Jubilee Scholarships Fund.

The program facilitates a hybrid work/academic exchange for Indigenous students at UVic, as well as Indigenous students at the University of Newcastle, Macquarie University and RMIT University in Australia. UVic students complete work terms with Indigenous centres at these institutions, while incoming Australian students take part in UVic's LE,NOṈET and complete a community-engaged learning experience.

Robina Thomas, executive director of UVic's Office of Indigenous Academic and Community Engagement says, "it is an honour to receive this award because it acknowledges the importance of WIL Exchange programs and the invaluable experiences they offer Indigenous students."

Engaging in experiential internships

A key element of this exchange is Indigenous community engagement. Through LE,NOṈET, Australian Indigenous exchange students engage with UVic Indigenous students through the sharing of historical, cultural and traditional ways of knowing and being. This prepares students to engage in an experiential internship in an Indigenous community or organization.

"These experiences are life changing and allow Indigenous students to explore, from a global perspective, both the similarities of colonization and also, importantly, the similarities of cultural, traditional and land-based teachings," says Thomas. "As countries around the world engage in processes of reconciliation, work-integrated learning programs are a careful and respectful step forward."

Galaxy clusters reveal a 10-billion-year-old story

Using high-powered telescopes including NASA's Hubble Space Telescope, scientists from Canada, the United States and Denmark have captured the clearest image known of a cluster of galaxies from 10 billion years ago in a discovery that provides clues the universe was more evolved than previously thought.

The discovery is the best-case example found so far of the mature, evolved system, says UVic astronomer Jon Willis, lead author of research published this month in *Nature*. Willis studies the physical contents of the universe covering many aspects of cosmology and astrophysics.

Willis, pictured on campus. UVIC PHOTO SERVICES.

Q. What is a galaxy cluster and what can they tell us about the universe?

A. A galaxy cluster can be likened to a great city of galaxies, though galaxies themselves are collections of billions of stars all held together by gravity. In simple terms, astrophysics is the study of our universe and our place in it. By studying the stars that make up the galaxies we can tell how old they are and when each galaxy first formed.

Q. What did your team of scientists find?

A. We've discovered what is the most ancient city of galaxies in the universe. It's the clearest snapshot yet of a galaxy cluster—it's like a Rosetta Stone. In the same way the Rosetta Stone was a glimpse into ancient Egyptian history, this discovery provides clues to understanding the physics of what was going on in that environment billions of years ago. Astronomy is wonderful in that seeing is believing. I don't need to show you an equation; I don't need to show you a complex model. I can show you an image in the sky.

Q. How unique is your discovery?

A. It's the most concentrated, easiest to see and the most prominent out of what's been seen. To put it in context, the universe is 13 billion years old and so the cluster is an old object in a young universe. We are very surprised to see how early the universe produced something so mature. Finding a galaxy cluster so early in the development of the universe tells us that—wow—the universe is capable of amazing things.

Q. Can you provide a simple analogy for this discovery?

A. It's the equivalent of meeting a child who displays all the characteristics of an adult. We have met these young clusters—when the universe was just over three-billion-years old—so we've found it's quite a precocious object and it can teach us about how physics works in the early universe.

Q. You've captured these images using high-powered telescopes. How do you gain access to these tools?

A. Although the Hubble Space Telescope is the most recent telescope we used, which gave us these wonderful views of the cluster, we have used a number of telescopes to get to this discovery. These include the European Space Agency XMM-Newton space observatory, the Canada France Hawaii Telescope and the European Southern Observatory Very Large Telescope.

Q. What's next?

A. We are fortunate that NASA is planning to launch the James Webb Space Telescope, which is the successor to Hubble, in late 2020 or early 2021. The first observing proposals are due in May 2020. Rest assured we'll be applying to study this cluster in much more detail.

HILLS CONTINUED FROM P. 1

Drug-testing program responds to opioid crisis

During his undergraduate studies, Hills saw first-hand the potential impact research can make in people's lives. As part of a small interdisciplinary team led by UVic chemistry professor Dennis Hore and social work professor Bruce Wallace, Hills helped establish an innovative drug-checking pilot project in 2018 that currently operates in three Victoria locations. The project aims to provide a quick, accurate chemical analysis of drugs in order to prevent overdoses, while also evaluating different drug-checking technologies.

"Before we had a team of technicians, social workers and computer scientists, it was all Rory. He got this project off the ground," says Hore.

For Hills, the experience was transformative. "It was a huge amount of work and a lot of ups and downs. It showed me just how demanding research can be. But it convinced me this is exactly what I want to do for the rest of my life. I want to use science to help find solutions to real-world problems," he says.

Responding to the global challenge of climate change

There is no greater challenge today for the planet than climate change, adds Hills. Under the supervision of UVic biochemist Alisdair Boraston, Hills' honours thesis will focus on studying proteins with potential for producing biofuels from seaweed.

"Rory is an extraordinary student, who has already made transformative contributions through his research," says UVic President Jamie Cassels. "The impact of his work will without a doubt improve and enrich lives, and promote a sustainable future."

The Rhodes Scholarship, which covers travel, living and study expenses at Oxford, supports outstanding students from around the world. Scholars are selected on the basis of academic achievement, exceptional character, leadership, achievement in extra-curricular activities and a commitment to solving humanity's challenges. Including Hills, 11 UVic students have been named Rhodes Scholars.

When doctors see big data

Stock image courtesy of VADA program.

New cancer screening methods use automated visual data for faster diagnosis, more accurate care

BY KATE HILDEBRANDT

UVic health informatics graduate student Amr Farghali has developed a tool to help visualize vast amounts of patient data—improving the speed and accuracy of cancer diagnosis.

"The human brain interprets visual images faster than text," says Farghali, who works full-time as a senior pharmacist. Farghali decided to redirect his medical science career to where the need was greatest: providing cancer specialists with faster, more efficient screening methods.

Now a master's student with UVic's School of Health Information Science (HINF), Farghali is completing the Visual and Automated Disease Analytics (VADA) program—a joint initiative between the University of Manitoba and UVic, funded by NSERC—in support of his PhD thesis. This program provides students with the techniques and tools to collect, analyze and visualize chronic and infectious disease data.

Translating data into visuals heightens understanding that can improve the quality and speed of screening and diagnostics, improving outcomes for patients.

Farghali focused on colorectal cancer, one of the top three most common and most deadly cancers in Canada. Colorectal cancer can advance quickly with little or no signs of a problem. Farghali noted there were too many false positives, compromised further by a shortage of specialists across the profession.

A 2019 report by the Canadian Cancer Society says nearly 30% of colorectal cancers in Canada are diagnosed at stage three—with 20% diagnosed at stage four.

"That's too late," says Farghali, as the stage four survival rate is less than 15%. "That rate stands at 90% if colorectal cancer is found at stage one."

Deeply familiar with health and wellness, Farghali, 40, is from Cairo, Egypt, where he retired from professional soccer following a knee injury. Competition for employment and higher education is fierce, he says, given Cairo's population of 40 million. Already a licensed pharmacist, Farghali chose to continue his studies in Canada.

"We find the world of informatics is revolutionizing all areas of health," says HINF Director Andre Kushniruk. "Not only are physicians and nurses gaining new abilities, pharmacists and other clinicians are are improving their capabilities with the latest informatics technologies."

Scheduled to complete his studies in August 2020, Farghali chose to do his internship with Victoria's Pacific Digestive Health, a clinic run by 13 gastroenterology specialists. This was a perfect match as Farghali needed their support to develop a workflow tool that would enable the visualization of vast amounts of select data.

Farghali predicts the emergence of artificial intelligence will further drive improvements in health care with its heightened visualization of analytics. Learning and applying algorithms, as Farghali is now doing in his VADA studies, offers an even more precise, more accurate picture of what the data says, offering unprecedented insights into diagnostics, care processes, treatment variability, and patient outcomes.

"That's exactly what I wanted my application to do," says Farghali. "By showing a wide range of variables, I can present various diagnostic possibilities that would enable medical professionals to allocate their resources more effectively." Doing so, he says, saves valuable time.

"Amr's knowledge of health informatics, data visualization and data analytics will advance the science in cancer care," says Elizabeth Borycki, HINF professor.

Farghali's thesis goal is to develop a sophisticated automated screening application where samples of colorectal diagnostics can be matched using visual data. An automated application would not only speed up the diagnostic process, it would also offer a higher level of accuracy.

"Outcomes are profoundly impacted when we treat any form of cancer in its earliest stages," he explains with concern for colorectal patients in Victoria waiting weeks, even months, for appointments to see specialists and for feedback on test results. "With these new technologies, we expect to see positive changes and improved patient outcomes."

Making molecules

Global partnership puts chemistry students ahead in designing and creating new molecuvles

BY JENNIFER KWAN

Chemistry students at UVic can now take part in an international program with Denmark-based pharmaceutical company LEO Pharma A/S that will provide them with hands-on learning during their academic course work.

As part of LEO Pharma's Open Innovation program announced last November, students are designing and synthesizing molecules at UVic, and sending them to Denmark for biological testing. This gives the students access to LEO Pharma's unique bioactivity tests to screen small molecule compounds against pathways implicated in skin diseases like eczema. In turn, LEO Pharma can potentially identify new chemical leads that may then be used in various levels of drug discovery.

The partnership includes sharing of traditionally confidential and proprietary research data and capabilities to involve UVic and students directly with innovative and clinically relevant research.

The project serves two goals: it focuses on global partnerships as a way to enhance innovation and create new research opportunities and knowledge mobilization, and it provides students with valuable training, says Jeremy Wulff, UVic chemistry professor and project lead.

"Students get a hands-on chance to create and test molecules to find next-generation treatments for skin diseases like psoriasis and eczema," says Wulff. "They also get to learn how a global, pharmaceutical company operates, which gives them an integrated, dynamic learning opportunity while studying at UVic."

At the announcement, BC Minister of Jobs, Trade and Technology Bruce Ralston praised the opportunities presented by joining entrepreneurial and educational interests. "This is a commendable initiative of collaboration that will help support the continued growth of BC's life sciences sector and drive our innovation economy even further. More importantly, this partnership brings with it great opportunity to advance research that has the potential to benefit people around the world."

around the ring

Staff award nominations

Know a UVic employee who deserves a round of applause? Individuals or teams who make UVic a great place to work and learn? Any UVic employee or recognized student organization can nominate an individual, group or team for a President's Extraordinary Service Award in one of four award categories. Those interested in submitting a nomination are invited to register for an optional nominator's workshop on Jan. 16, 2019. The nomination deadline is Feb. 6, and results will be announced at the Cause for Applause awards event in April. Visit *uvic.ca/pesa*

Call for emergency first aid volunteers

Do you have first aid skills and training? The Emergency First Aid Unit is a new campus volunteer team that may be asked to assist in providing first aid following a large emergency or disaster—such as an earthquake—that overwhelms regular first aid and medical response on campus. Students, faculty and staff with up-to-date first aid certification are invited to join the team and participate in monthly training sessions. Campus Security staff will continue to provide first aid services for day-to-day emergencies. Learn more and download an application form: *uvic.ca/firstaid*

Learning the living lessons of the Maasai

Geography field school in Tanzania goes far beyond tourism

BY ANNE MACLAURIN

Students on a safari, Serengeti National Park. PHOTO: PHIL DEARDEN

Last August, as the sun set on the Serengeti National Park, 19 UVic geography students and their instructors arrived in Tanzania to begin a month-long field school on conservation management.

Despite the difficulties of water rationing and extreme weather, it was a trip of a lifetime for the students, who immersed themselves in the customs and culture of Tanzania while learning about local forest management and ecological conservation practices.

The students—led by geography professor Phil Dearden, adjunct professor Bruce Downie and teaching assistant Emmanuel ole Kileli—divided their time between two locations: the Mkange village near Saadani National Park and the Enguserosambu community forest lands (the traditional homeland of the Loita Maasai).

Many of the students had not previously travelled outside Canada, remarked Dearden, but they demonstrated an openness and willingness to engage with the local communities.

"We were very impressed with the students' resilience—they never complained even though it was cold and windy in the Maasai camp and water was rationed," says Dearden.

The students were tasked with group projects, and final assignments focused on practical suggestions on how to improve various aspects of the Maasai conservancy area. The Maasai have been engaged with forest management for generations, but were open to sharing ideas and best practices.

Chenoah Shine, a recent geography graduate, said, "my favorite part of the field school was the opportunity to engage with the Loita Maasai people of the Enguroserosambu Ward. This experience was enlightening. I believe the opportunity to try and understand a different epistemological view is so important for the development of compassionate, engaged, critical and open-minded citizens."

Shine explained how, "in the formation of this project we interviewed locals in their homes, met with the Elders' Council and Enguroserosambu Forest Trust board, and learned about Maasai forest management practices from our local guides during forest walks."

UVic and the Loita Maasai have shared a partnership through the Kesho Trust for a number of years. Last spring, the UVic geography department hosted a visit from some members of the Loita Maasai who travelled to BC to share approaches to resource management and traditional lands.

For fourth-year UVic student Rachel Stewart-Dziama, the Mkange village stood out. "The people were incredibly friendly and welcoming," she said, "eager to know about our experiences in Tanzania. The village was vibrant with bright colours and bold patterned fabric. Chickens wandered between red mud homes as children played. Women fanned cooking fires, working together in the shade."

She said sitting outside with the Maasai's Enguserosambu Ward's Elders' Council discussing how their communities could help prevent climate change was a moment she would never have imagined.

"Their desire to contribute to the global effort forced us to take a closer look at what Canadians are doing and how we can play our part in mitigating climate change," added Stewart-Dziama.

After the students completed their community projects and before their long flight home, they had an opportunity to go on a safari and really explore the environment that was home to the Maasai.

"We arrived at the Serengeti world heritage site at dusk," said Dearden, "as we drove into the national park we saw a beautiful male lion babysitting five playful cubs, not five yards from the road. The cubs jumped on him, chewed his mane—it was an incredible experience."

The students returned to Canada with a new appreciation for other cultures and ways of knowing as well as a deeper commitment to conservation management.

"It was an important experience in my educational career that provided perspective and strategies to meet the growing challenges of our time—it was an inspiration," said a student.

The Tanzania field school will be offered again in 2020 by the Department of Geography. Please visit the department website for more details. *uvic.ca/geography*

A women's meeting during the field school. PHOTO: PHIL DEARDEN

Vikes men's rugby crowned national champions

A storied rivalry in Canadian university men's rugby fifteens culminated on Sherbrooke Field on Nov. 24 in Montreal. The Vikes and UBC Thunderbirds, both powerhouse rugby programs in BC, went head to head for national championship supremacy.

Despite being down 12-0 early on in the game, it was the Vikes who battled back to come out on top, 21-20.

The victory was the program's third championship title following wins in 1997 and 1998. After 1998 the Canadian University Championship went on hiatus but was resurrected in 2017 thanks to the Canadian Rugby Foundation. The Vikes earned a silver medal in 2017 and then hosted and finished with a bronze medal in 2018.

This season's eight-team tournament for was hosted by Concordia University and included teams from Western Canada, Ontario, Quebec and the Maritimes.

On Nov. 24, longstanding head coach Doug Tate showed his experience as he led the Vikes to overcome an early 12-0 deficit. UVic's James O'Neill scored two tries, both converted by Jenner Teufel, to leave the Vikes trailing 14-12 at half time.

The Vikes continued when Nick Carson scored a third try for his side and Teufel converted to leave the Vikes up 21-15. UBC had a chance to take the game in the final seconds of play as a try from Evan Morris put the Thunderbirds down by one. A missed convert left the Vikes victorious, 21-20, with no time on the clock.

O'Neill was named the game's MVP.

The win marked UVic's 80th overall national championship won across all sports. It's also the second championship won this fall following the Vikes women's field hockey team claiming their second-straight national title in November.

Hoisting the trophy at the championship. PHOTO: BRIANNA THICKE