Canadian Light Source Inc.

ANNUAL HIGHLIGHTS 2019

THE BRIGHTEST LIGHT IN CANADA

Canadian Light Source | Centre canadien de rayonnement synchrotron

VISION

Delivering innovative solutions as a leading centre for research excellence in health, agriculture, environment, and advanced materials.

MESSAGE FROM **THE CHAIR OF THE BOARD**

I had the honour of becoming the Chair of the Board of Directors following our June 2018 meeting.

I have been involved with the CLS since its opening, in my former position as Vice-President, Research Grants and Scholarships at NSERC. I have met all the CLS CEOs and discussed the various issues facing them, and followed the growth of the facility from its opening to today. I see the incredible scientific opportunities the unique set of beamlines offer.

Then, a few days after becoming the Chair of the Board, I got a phone call from CEO Rob Lamb saying the facility was down due to a power source failure.

What followed were six months of intense activity on the part of the Machine group, and the rest of the CLS staff – our staff is so incredibly dedicated, even in stressful and uncertain times. There were many discussions with and briefings for our funders and government officials. A short-term solution was found from a 90-year-old engineer who happened to have a spare power source and e-gun in his garage.

The Board understands the impact the shut down has had on users, and we sincerely thank them for their ongoing support. The CLS continues to listen to its communities of users and funders through surveys, townhalls, workshops and face-to-face meetings. We have listened and learned that light source-based science must move toward smaller brighter beams of light while stewarding the current machine to support our clients. The future looks bright for the CLS as our users address important challenges to Canada.

A final word – the CLS has a very engaged Board of Directors and we are committed to ensuring the health of synchrotron-based science in Canada now and for decades ahead.

Isabelle Blain, Chair
Board of Directors

MESSAGE FROM **THE CEO**

The CLS is a national research facility, one of the largest science projects in our country's history, and a critical tool for Canadian research and development in energy, health and agriculture, and advanced manufacturing.

At the heart of the CLS is the synchrotron machine. The commencement of stage one top-up operations early in the year effectively meant that the brightest light in Canada is now always on during operations. The final set of seven beamlines saw light, and everything was on track for a fully operational CLS with 22 beamlines by year end.

Then, in June, disaster struck.

The machine was built at the turn of the 21st century on the foundation of the Saskatchewan Accelerator Laboratory established in the mid 1960s. Sixty-four years on, some of the original instrumentation now used in critical CLS operations failed and the facility found itself in the midst of an unplanned shutdown.

The crisis was tangible and it swiftly impacted our users – supervisor and student projects stalled, industrial research came to a halt and for hundreds of staff, everything just stopped.

It is a credit to the ingenuity and sheer doggedness of those in the Machine Division that the machine was bought back to life within six months. In the meantime, the Science and Finance and Corporate Divisions had a chance to look inwards and review all internal processes, streamlining the way the CLS interacts with its users. This was the year the in-house developed user portal went live and all beamlines underwent a detailed assessment. All of this was value add to the CLS product – the science.

Even with the shutdown, CLS users were supportive and productive with close to 300 scientific publications and student theses, and 175 protein structures determined – everyone had time to catch up.

The industrial engagement program regained momentum and continues to be world leading with more than 162 projects completed for more than 70 clients and serves as the basis for our customer first user program.

These discoveries and partnerships are only made possible by the dedication of our staff, the support of our users and the backing of our funders.

Dr. Robert Lamb
Chief Executive Officer

CANADIAN SCIENCE **PARTNERS**

Thousands of scientists and students from institutions across Canada have used the CLS to conduct world-leading research.

HOW THE LIGHT SOURCE **WORKS**

1 ELECTRON GUN

Bursts of electrons are injected into a ultra-high vacuum stainless steel tube.

2 LINEAR ACCELERATOR

Microwaves increase the speed of the electrons to 99.9998 per cent of the speed of light.

3 BOOSTER RING

In the ring, microwaves continue to accelerate the electrons; they travel around the ring 1.5 million times in 0.6 seconds.

4 **STORAGE RING**

Magnets bend the electron beam many times, producing a super bright light.

5 **BEAMLINES**

Beams of light are directed down the beamlines to experimental stations.

OUR YEAR IN NUMBERS

2,204 SHIFTS DELIVERED

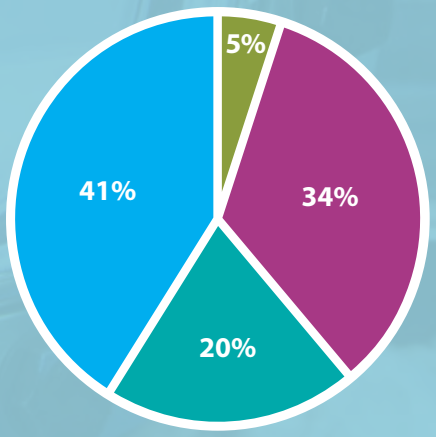
USERS FROM 9 COUNTRIES AND 7 PROVINCES

1,159 GENERAL USER VISITS

900 BILLION
ELECTRONS CIRCULATING IN THE STORAGE RING

USER DISCIPLINES

USAGE BY STRATEGIC AREA



ELECTRONS IN THE BOOSTER RING TRAVEL FAST ENOUGH TO REACH THE **MOON** IN

1.3 SECONDS

USERS FROM

20

CANADIAN UNIVERSITIES

560

GENERAL USERS

565

SCIENCE PUBLICATIONS

HQP

368

CARLETON PROFESSOR DEVELOPS NEW X-RAY MACHINE FOR HELMET TESTING

- The Charlatan, Jan 31, 2019

Saskatoon

Scientists use Saskatoon synchrotron for atom-by-atom look at deadly heart defect

- CBC, Jan. 14, 2019

Quantum material is promising 'ion conductor' for research, new technologies

- Science Daily, Aug. 16, 2018

Canadian Light Source

- CJWW, Sept. 19, 2018

NEWS HIGHLIGHTS

Scientists discover that charcoal traps ammonia pollution

- Phys.org, Feb. 12, 2019

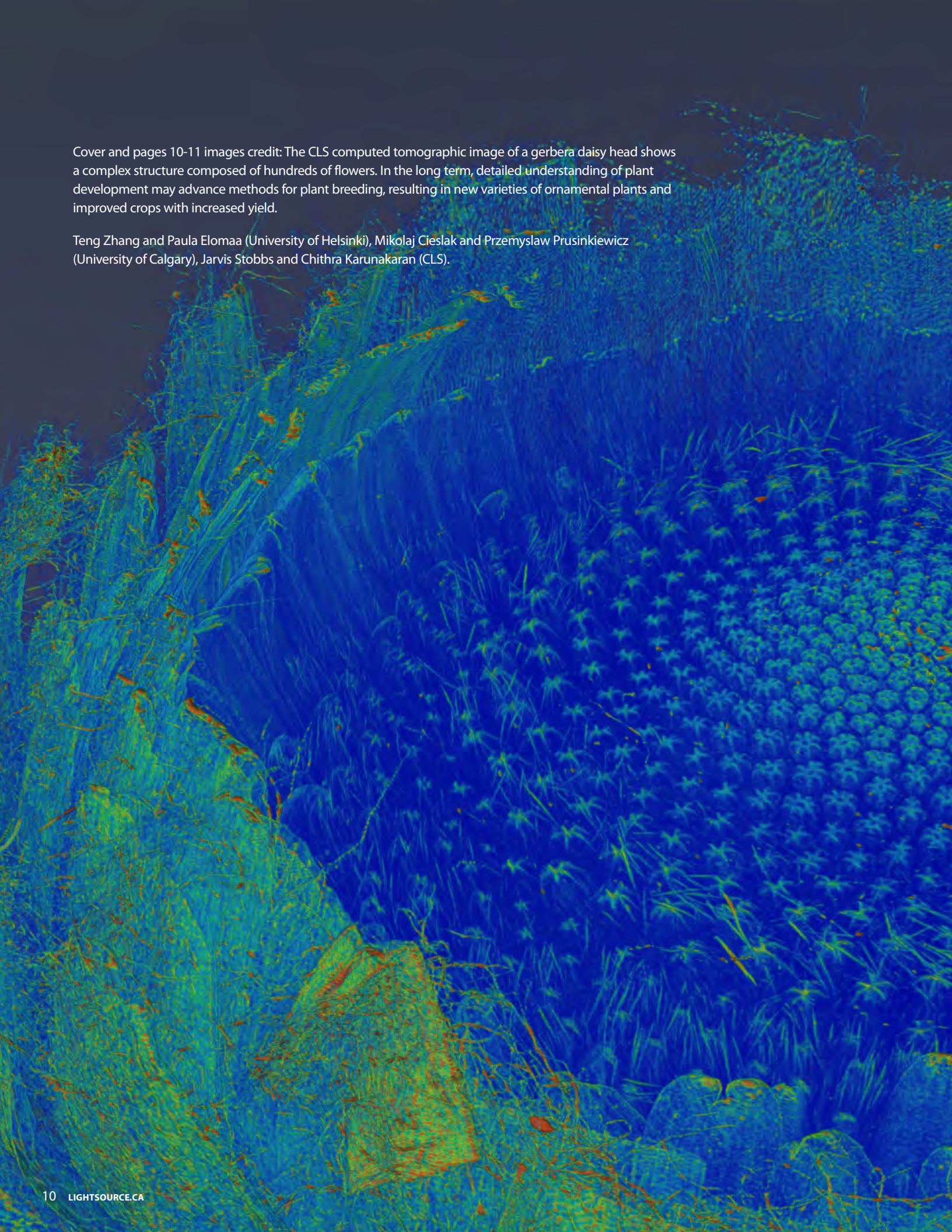
Medical isotopes: Out of Sask into local patients

- CBC, May 1, 2018

Novel solid-phase transformation enables high-energy Li-S batteries in conventional Li-ion electrolyte

- greencarcongress.com, Nov. 26, 2018


X-Ray microscopy conference brings scientists from around the world to Saskatoon
- CBC, Aug. 20, 2018
Blaine Lake high school students conduct experiments at national research lab
- Shellbrook Chronicle, June 1, 2018
University of Saskatchewan researcher investigates link between copper and Alzheimer's
- CBC, Feb. 4, 2019
The Fate of Franklin Expedition's Crew Was Debunked By Saskatoon's Synchrotron
André Blair
- Advocator, Aug. 28, 2018
Tours Next Week
Canadian government invests $11 million in 14 projects across Saskatchewan & Canada
- CKRM, April 27, 2018
U of S research looking at 3D printing tech as possible answer to nerve damage
- CBC, July 27, 2018
Canadian Light Source extends shutdown to repair electron gun
- Saskatoon StarPhoenix, July 30, 2018
Research examines function of clubroot resistant genes
- The Western Producer, June 14, 2018
Canadian company sheds new light on agriculture research
- Asia Times, Nov. 15, 2018
Canadian Light Source research paving way for next-generation electronics
- Global News, July 24, 2018
CO2 Conversion: Turning Waste Into Value
- Sciencetrends.com, Aug. 7, 2018
atoon's synchrotron,
Carlton students present findings from test for heavy metals in North Sask. River
- paNOW, June 16, 2018
Scientists use Canadian Light Source to prove tungsten causes health concerns
- CBC, May 1, 2018



Cover and pages 10-11 images credit: The CLS computed tomographic image of a gerbera daisy head shows a complex structure composed of hundreds of flowers. In the long term, detailed understanding of plant development may advance methods for plant breeding, resulting in new varieties of ornamental plants and improved crops with increased yield.

Teng Zhang and Paula Elomaa (University of Helsinki), Mikolaj Cieslak and Przemyslaw Prusinkiewicz (University of Calgary), Jarvis Stobbs and Chithra Karunakaran (CLS).

SCIENCE HIGHLIGHTS

HEALTH

Bio-printed scaffolds help regenerate damaged peripheral nervous system

The peripheral nervous system controls the body beyond the brain and spinal cord. It can be damaged by many things, including poor diet, trauma or diseases like diabetes, which affects 3.4 million Canadians. A group of researchers from the University of Saskatchewan are looking at ways to use a combination of 3D printing and biotechnology to help regrow damaged nervous systems. By 3D printing Schwann cells in a hydrogen-based scaffold, damaged nerve cells can be guided as they regenerate to ensure proper growth. This new way of restoring nerve cells can go beyond healing peripheral nerve cells to help solve future tissue engineering applications.

DOI: 10.1088/1758-5090/aacd30

Finding holds potential for more effective treatments for cystic fibrosis (CF)

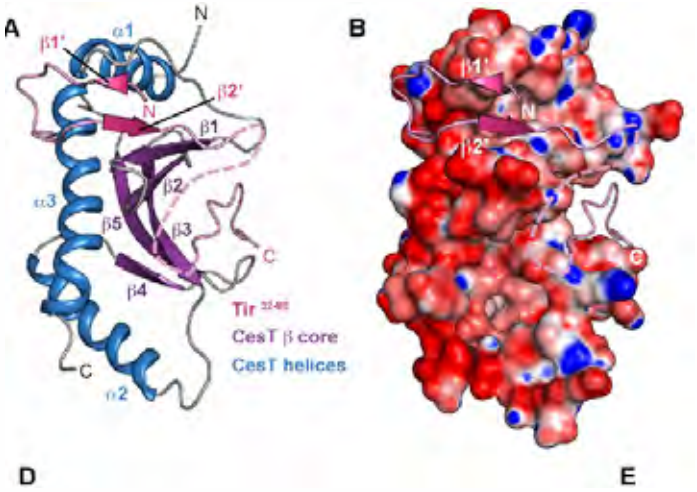
A University of Saskatchewan medical team has made a major discovery with potential for more effective treatments for cystic fibrosis (CF). Doctors typically treat CF patients with an inhaled salt solution that, by drawing water from blood, produces airway surface liquid (ASL), a microscopically thin liquid lining that helps remove secretions from the lungs. The research revealed that only about half of the ASL production is through osmosis; the other half is from the mist stimulating airway neurons. The researchers believe this new understanding of how the body produces ASL will lead to new formulations to maximize the beneficial effect.

DOI: 10.1038/s41598-018-36695-4

Understanding enzyme structures important in tuberculosis drug treatments

There are around 1,600 new cases of bacterial tuberculosis reported every year in Canada. Scientists from the University of British Columbia are researching how the bacteria grows in the lungs to better understand how to treat it. They found that the tuberculosis bacteria can grow on cholesterol, unlike other bacteria that needs glucose to grow. The group was also able to determine the structure of the enzyme that helps the bacteria break down the cholesterol molecule. Being able to understand the structure of enzymes and how they work is important in developing drugs to treat diseases like tuberculosis.

DOI: 10.1073/pnas.1717015115



High-resolution imagery identifies details of E.coli toxin delivery

A microbe responsible for gastroenteritis, known formally as enteropathogenic E. coli (EPEC), causes infections by directing a needle-like projection into cells in the human intestinal tract and releasing toxins that make people sick. But effective delivery of the toxins require a chaperone, an agent that protects proteins to achieve a specific chemical conformation. Using high-resolution imagery, researchers from McMaster University have been able to sort out the structural details of the process and have created potential for the design of a drug or antimicrobial peptide that will neutralize the way EPEC causes infections like gastroenteritis.

DOI: 10.1371/journal.ppat.1007224

New research helps with malaria vaccine design

A protein molecule essential for the malaria parasite *Plasmodium falciparum* to go through the sexual stages of its lifecycle was the focus for scientists from SickKids in Toronto in their quest for a biomedical intervention to halt the spread of the deadly disease. Disrupting the parasite's lifecycle could reduce infections and deaths from malaria because transmission between humans would be blocked by inhibiting parasite development in the Anopheles mosquito. People with malaria produce antibodies that bind the protein so understanding that process at a molecular level provides clues for vaccine design.

DOI: 10.1038/s41467-018-06742-9

AGRICULTURE

Study reveals how Norway spruce cells respond to seasonal light

Plant scientists from the Norwegian University of Life Sciences investigated winter bud cells from Norway spruce and how they differ with respect to the amount of daylight to which they were exposed. While it is common knowledge that trees grow when days become longer in the springtime and stop growing when days become shorter in the fall, exactly how this happens has not been well understood. This research could allow for better predictions of how trees might respond to climate change, which could bring freezing temperatures while daylight is long or warmer temperatures when daylight is short.

DOI: 10.3389/fpls.2017.02109

Feeding seaweed to cows

Cattle on the Prairies are hundreds of kilometres from the coast and yet it is possible seaweed could make its way into their diet as an additive. "Seaweed is an incredible opportunity," said a research scientist at Agriculture and Agri-Food Canada's Lethbridge Research and Development Centre. "It is a sustainable feedstock. It grows rapidly and it doesn't require arable land or fresh water to grow." The research group wants to use the rare sugars found in seaweed to promote specific bacteria growth that has beneficial properties in the intestines of cattle. If more livestock feed came from seaweed, less would have to be produced from traditional crops such as corn.

DOI: 10.1038/s41467-018-03366-x

Wetland plants considered as fuel cell catalysts

Due to rising global energy demands and the threat caused by environmental pollution, the search is on for new, clean sources of energy. Researchers from the Institut National de la Recherche Scientifique, Québec are looking at tall wetlands plants like reeds in order to make cheaper catalysts for high-performance fuel cells. Unlike a battery, which stores electricity for later use, a fuel cell generates electricity from stored materials or fuels. Hydrogen-based fuel is a very clean fuel source that produces only water as a by-product, and could effectively replace fossil fuels. In order to make hydrogen fuel viable for everyday use, high-performance fuel cells are needed to convert the energy from the hydrogen into electricity. These new fuel cells could create opportunities for new forms of batteries in the future.

DOI: 10.1016/j.apcatb.2018.05.046

Non-destructive imaging advances study of wheat disease

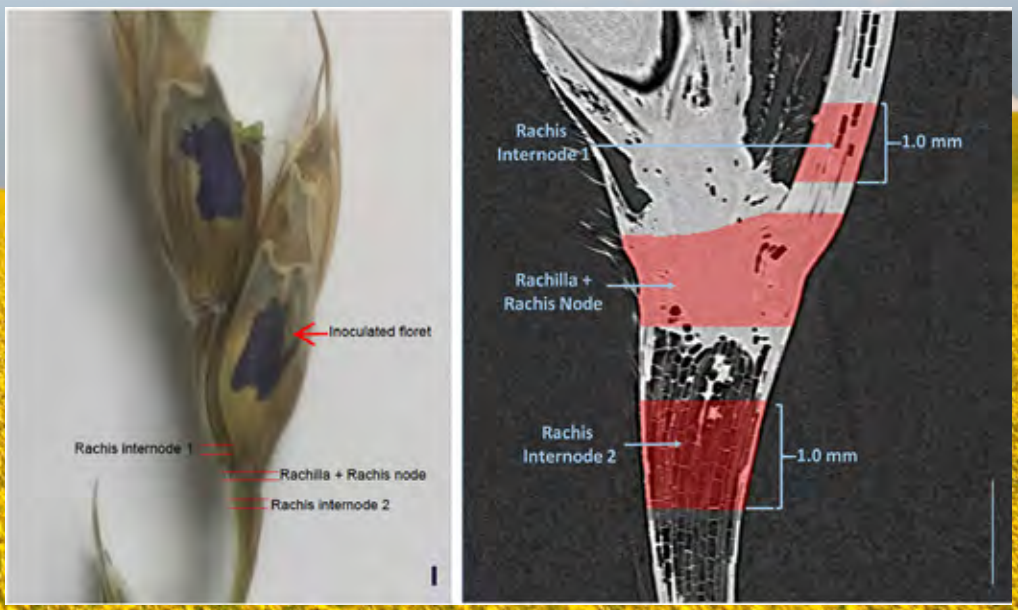
Wheat is a staple food for over 50 million people but global pathogens like fusarium, which causes head blight, reduces both yield and quality. Breeding wheat resistant to fusarium is considered environmentally safe and cost effective but previous investigations were not able to identify the key tissue responsible for that resistance because testing methods damaged the study samples. Researchers from the Crop Development Centre at the U of S took a different approach and used non-destructive 3D imaging to analyze and quantify the changes in tissue structure caused by fusarium. The study demonstrates the effectiveness of state-of-the-art imaging technology in the study of host-pathogen interactions.

DOI: 10.1111/pce.13431

Phosphorus shown to feed plants much longer than previous thought

Testing soil samples at the CLS has helped a University of Saskatchewan soil scientist understand how tripolyphosphate (TPP), a slow release form of phosphorus fertilizer, works in the soil as a plant nutrient for much longer periods than previously thought. The study found that the adsorbed TPP was present in the soil for up to a year. However, it is unclear how useful this fertilizer is over time, warranting further study to determine whether microbes in soil are capable of using this source of phosphorus. The practical implications for agriculture may come in finding ways to use these slow-release fertilizers within calcium-rich soils, such as those generally found in Saskatchewan.

DOI: 10.1186/s12932-017-0046-z



ENVIRONMENT

Taking a new approach to analyzing organic carbon in soil

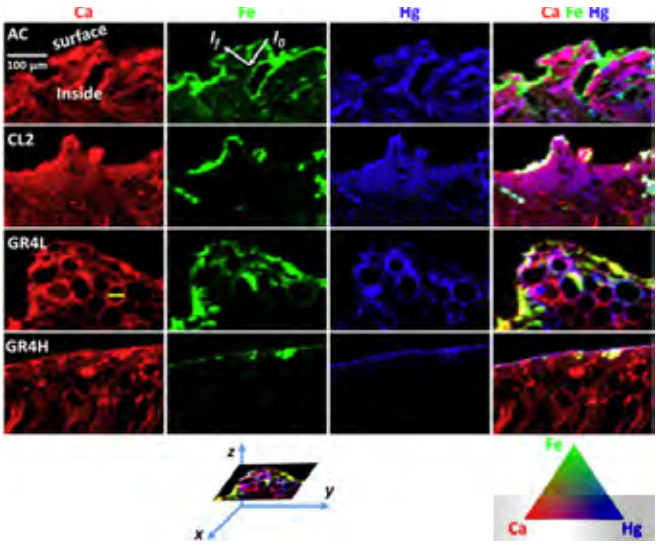
Scientists from Stanford University are opening a window into soil organic carbon, a critical component of the global carbon cycle and climate change. The decomposition of plants and their roots deposits organic carbon in the soil. Microorganisms, decomposing animals, animal feces and minerals also contribute to the organic carbon in the soil. In turn, plants and microorganisms "eat" that carbon. All of this results in different "flavours" within the soil. Trying to differentiate between the different "flavours" of organic carbon has been difficult. Previous research involved analyzing soil using harsh chemicals that would change the chemical composition of what you want to study. The researchers developed a new approach where chemicals are not needed. This study contributes to an understanding of the mechanism in the carbon cycle that is needed to predict what would happen if the temperature rises due to climate change.

DOI: 10.3390/soils2010006

Creating plastics out of sunshine and pollution

The International Energy Agency estimates the production of the main precursors for plastics is responsible for 1.4 per cent of global CO2 emissions. A new technology from University of Toronto Engineering is taking a substantial step towards enabling manufacturers to create plastics out of two key ingredients—sunshine and pollution. They envision capturing CO2 produced by other industrial process and using renewable electricity such as solar power to transform it into ethylene. Ethylene is a common industrial chemical that is a precursor to many plastics, such as those used in grocery bags. By transforming this carbon into a commercially valuable product like ethylene, the team aims to increase the incentives for companies to invest in carbon capture technology.

DOI: 10.1126/science.aas9100



More nitrogen will characterize next generation of slow-release fertilizers

Cornell University scientists, along with other collaborators, have shown that charcoal can absorb large quantities of nitrogen from the air pollutant ammonia, resulting in the potential to create slow-release fertilizers with more nitrogen than most animal manures or other natural soil amendments. Ammonia is common in fertilizers but is a highly reactive gas and an indirect contributor to climate change. Charcoal, by contrast, is a natural material that can retain and supply essential nutrients to plants. The study identified charcoal's ability to capture nitrogen from airborne ammonia, which paves the way to slow-release fertilizer for field and greenhouse crop production.

DOI: 10.1038/s41467-019-08401-z

Looking at how Alpine lakes are affected by climate change

Alpine lakes in the Rocky Mountains are important biological hot spots of that ecosystem. These lakes do not have enough nutrients to support large amounts of aquatic life because of the cold climate in the surrounding watershed. Researchers from the University of Wyoming, the U.S. Geological Survey and the Canadian Light Source conducted experiments on the fine dust deposited to the Rocky Mountains to learn more about how alpine lakes could be affected by climate change. Their work showed the phosphorus in the dust is mainly bound to calcium. This form of phosphorus is unstable and will dissolve in acidified lakes. Considering the increasing dust input due to changes in the climate and land use, and the acidification of these alpine lakes, this study suggests alpine lakes may not be limited in phosphorus in the future.

DOI: 10.1021/acs.est.7b04729

Research continues on how biochar stabilizes mercury

Mercury can be distributed in air, bodies of water, soil and sediments, and in its most toxic form, can cause defects to the central nervous systems. Previous research has shown biochar, or charcoal, effectively stabilizes mercury when added to aquatic environments, particularly sediments. Scientists from the China University of Geosciences, the University of Waterloo and the CLS Science Division took the work a step further by evaluating the distribution of mercury in biochar particles. The results suggest mercury accumulated by particles is less likely to be transported by water or consumed by aquatic organisms, expanding the understanding of biochar's role in mercury stabilization in situations like site remediation.

DOI: 10.1016/j.scitotenv.2019.01.148

ADVANCED MATERIALS

Material could boost energy efficiency of electronic devices

Cutting-edge experiments conducted at the CLS in collaboration with the University of British Columbia and the Max Planck Institute for Solid State Research have led to a key advancement in materials science that paves the way for creating more powerful and energy efficient electronic devices in the future. Among the interesting properties of the ceramic-like material studied is that at room temperature, it conducts electricity but when cooled to a temperatures of minus-200 Celsius or colder, it suddenly becomes a robust insulator. What they found was that as the material was made thinner and thinner, researchers could control the magnetism in the atoms to align in a straight line rather than the spiral shape. The long-term goal is to enable the creation of functional devices using similar materials.

DOI: 10.1038/s41567-018-0218-5.

Protein-gold nanoclusters have uses in health and the environment

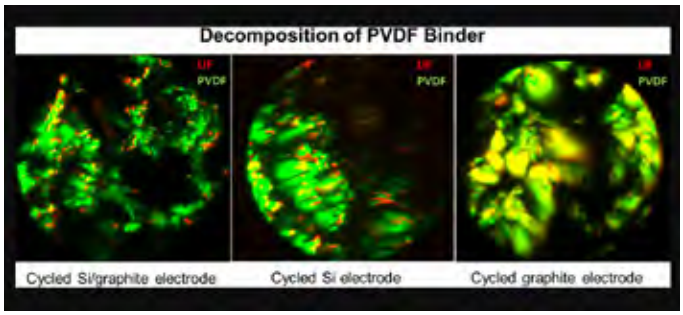
A group from Dalhousie University studied remarkable, tiny self-assembling clusters of gold and protein that glow a bold red. And they are useful—the protein-gold nanoclusters could be used to detect harmful metals in water or to identify cancer cells in the body. The structure of these clusters had been a long-standing question in the field. In the lab, researchers have shown that introducing other metals to the protein and gold solution can quench the nanogold's bold glow, a property that could be used to detect metal pollution in rivers and other water bodies. Even more exciting are the potential health applications for these clusters; nanogold and proteins are a natural fit for health technology since proteins occur naturally in the human body, and gold is completely non-toxic.

DOI: 10.1039/C7SC05086K

Designing a better dental implant

About three million people a year in North America get dental implants. A group from the Department of Material Science and Engineering at McMaster University are finding new ways to build better dental implants. Up to five percent of implants fail in the first 10 years and they have an expected lifespan of 20 to 25 years. The group found they could improve the connection between an implant and its surrounding bone by altering the surface of a titanium implant. This finding can help future dental implants and could be applied to other metal implants like plates used to secure bone fractures and engineered knees and hips.

DOI: 10.1002/admi.201800262



Chemistry holds the key to better lithium-ion batteries

The search for a better lithium-ion battery—one that could keep a cell phone working for days, increase the range of electric cars and maximize energy storage on a grid—is an ongoing quest, but a recent study by the National Research Council of Canada showed the answer lies in chemistry. Using a new battery characterizing method, the scientists showed degradation of batteries with graphite and silicon electrodes is caused by decomposition of the binder that holds the elements together. The findings will guide the design of more suitable binders and ultimately higher energy density batteries.

DOI: 10.1021/acsomega.8b01388

CLS part of the effort to photograph black holes

Scientists from NASA's Goddard Flight Center used the bright light of the CLS to imitate the X-rays emitted by black holes in order to calibrate delicate telescope filters. The goal—to photograph a black hole at the centre of our galaxy and the gasses that surround it—requires sensitive filters that can determine which photons pass through to the image and which are blocked. The filters will be used on the Xrism telescope, expected to be launched by the Japanese space agency and NASA in a few years, and must be able to withstand the vibrations of launch and temperatures of -273 degrees C in space. Speaking to CTV News, NASA's Nick Thomas said the filters are thin pieces of plastic with an even thinner aluminum coating. He added the Xrism telescope is expected to orbit the Earth for at least a decade, "and we'll definitely be making some nice photos."

FINANCIAL **HIGHLIGHTS**

Financial Highlights for the year ended March 31, 2019

(in thousands of dollars)

Funding for fiscal 2019 totaled $33,626, comprised of Federal, Provincial, University of Saskatchewan, and CLS self-generated revenue sources.

Federal grants, representing 75% of overall operating funding, totaled $25,023 and included funding from a variety of federal funders including CFI, NSERC, CIHR and NRC. During the fiscal year, CLS secured an increase in matching funding from our major funder, the Canada Foundation for Innovation, which enables greater leveraging of other funding sources.

Provincial and University of Saskatchewan funding remained consistent with the prior period, representing 12% and 8% of overall operating funding for the facility. However, given the increased matching profile from CFI, the flat level of funding enabled the CLS to access a greater level of CFI funding.

Industrial and other revenue was lower in the current fiscal year. This is a result of the unplanned shutdown that occurred during the 2019 fiscal year, resulting in lower Industrial Science program revenue. With the facility returning to normal operations, it is anticipated this revenue will recover in future fiscal periods.

Operating expenditures totaled $32,475, consisting of salaries and benefits, repairs and maintenance, supplies and services, and utilities.

Salary expenditures totaled $20,428 in the period, representing 63% of operating costs. Increased funding achieved in the final quarter of fiscal 2019 allowed for additional staff to be hired. This trend will continue as CLS works toward completing staffing plans aligned with current operational funding.

Repairs and maintenance expenses totaled $4,719, representing 14% of operating expenditures. Repairs focus on maintaining and improving the core facility (LINAC, booster and storage rings), as well as the operating beamlines at the CLSI to provide world-class science to our end users.

Supplies and services costs totaled $4,779, representing 15% of operating expenditures. Supplies and services are key to operating the facility, providing consumables for the facility and necessary consulting and service contracts.

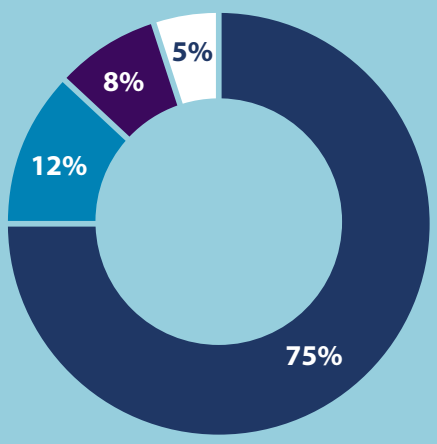
Utilities in the year represented 8% of operating costs for a total of $2,549. This represented an approximate $800k savings for fiscal 2019, and were a result of the unplanned shutdown. Utility expenses are anticipated to return to normal levels in future periods.

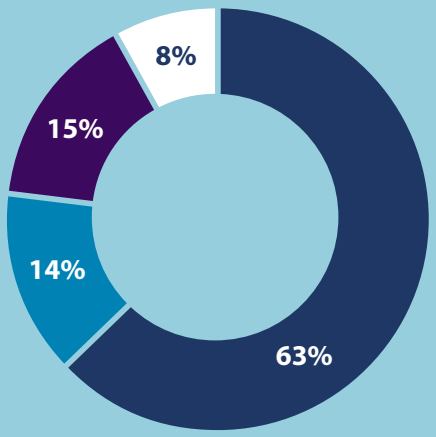
REVENUE

Federal operating grants	$	25,023
Provincial operating grants		4,100
Grant from U of S		2,774
Other revenue		1,729
	$	33,626

EXPENSES

Salaries and benefits	$	20,428
Repairs and maintenance		4,719
Supplies and services		4,779
Utilities		2,549
	$	32,475





- Federal operating grants
- Provincial operating grants
- Grant from U of S
- Other revenue

- Salaries and benefits
- Repairs and maintenance
- Supplies and services
- Utilities

A little **birdie** told us...

CanadianLightSource

"The CLS is the only facility in Canada where unique plant imaging capabilities and world-class scientific expertise can be used to reveal the internal structure of canola seeds & to better understand and mitigate potential problems." Chithra Karunakaran, CLS Agriculture Lead

CanadianLightSource

Approximately 1 in 3 women will suffer a bone fracture from bone loss in their lifetime, whereas only 1 in 5 men are affected. @uakron assistant professor of biology Janna Andronowski is leading a research project investigating why this variation occurs #OntheBeamlines

CanadianLightSource

We are excited to introduce Gianluca and Christopher from Vancouver and Birch Narrows First Nation. These young researchers did a fantastic job of investigating Calcium in fruits and vegetables this week!
#yvr #youngscientists #synchrotron

CanadianLightSource

Dr. Ingrid Pickering receives achievement award from@_shrf_
Her work uses synchrotron technology to understand the effects of heavy metals on human health and the environment. Congratulations Ingrid!
buff.ly/2AZQt80

CanadianLightSource

You are invited to the @MofAntiquities for a research poster session and reception! This afternoon, 2:30-5 p.m.

Undergrad @usask Chemistry and Classical, Medieval & Renaissance Studies students present work on roman coins, medieval manuscripts & ancient pottery

CanadianLightSource

Allowing students to put their scientific inquiries to the ultimate test
ow.ly/yrYn30kHodz
#YYC

Calgary high schools lead the way in Fraser Institute's Alberta rankings
City schools rank among the best in the province, according to the 2018 Fraser Institute Report Card on Alberta Secondary Schools released June 14.

CanadianLightSource

Happy #WorldSleepDay everyone. In 2015, researchers from Switzerland, Germany and Canada used the CLS to suggest an improved way to target and treat sleeping sickness, a disease that impacts rural communities in sub-Saharan Africa. Read more: lightsource.ca/news/details/b... @UofT

CanadianLightSource

#WithinMeasure is a beautiful collection of images @JSGauthier created with our #synchrotron CT imaging capabilities. Catch it at @Beakerhead in #YYC this weekend!

CanadianLightSource

This fall, our Light Source Student Experience (LiSSE) program will focus on hands-on research that doesn't require beam. Have your classroom learn about science and society or interpret soil data from across SK

#scied #synchrotronSTEM

Learn more: lightsource.ca/lisse

CanadianLightSource

Congratulations to the CLS Ice-o-topes who finished their first season with a record of 14-15-2 in the middle of the standings. Well done!

CanadianLightSource

The large blue metal section contains one of the storage ring's main dipole magnets. There are 24 of these in the ring, weighing about 11 tonnes each! The magnets bend the electron beam around the ring.

CanadianLightSource
@CanLightSource

Following

On March 31, 1999, CFI contributed $56.4 million to help build the CLS, which is one of the largest science projects in Canada's history and a critical tool for Canadian research and development. Thank you @InnovationCA for 20 years of support! buff.ly/2JKTu0k

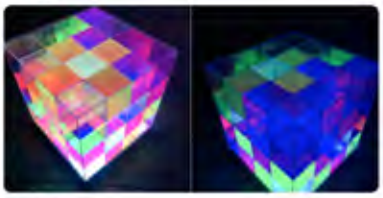
10:00 AM - 31 Mar 2019

CanadianLightSource

#INWED18: Jignya Patel is an Electrical Engineer with the Accelerator Operations and Development department, specifically focused on Radio Frequency engineering, a key part of the CLS machine's operation.

CanadianLightSource

We're at @NuitBlancheYXE tonight with Laura Payne's beautiful diffraction-inspired piece 4^3. On River Landing, by the pump house!



CanadianLightSource

University of Saskatchewan researcher investigates link between copper and Alzheimer's | CBC News buff.ly/2U0COCq

CanadianLightSource

Last night of @Sci_Od tours. Great tour guides showing off #TheBrightestLightInCanada. Seven days and 413 visitors. Thanks for coming.

CanadianLightSource

This is the interior of our new power supply! Testing is ongoing.

CanadianLightSource

This episode of Radio-Canada's excellent French-language science TV show Découverte features one of our most exciting and unusual research projects: Madalena Kozachuk's work uncovering images in damaged daguerreotypes buff.ly/2Sqelhn

Thank **You**

Thank you to our government, academic and corporate funding partners for their investment in Canadian science and discovery.

OPERATING

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