

Spring 2016

ZYGOTE PLUS



A newsletter for alumni of the College of Biological Science

Government Invests in DNA Barcoding

MINISTER OF HEALTH Jane Philpott recently announced a new federal investment in genomics research to improve plant protection and food safety regulation.

The funding will allow the U of G-based Biodiversity Institute of Ontario (BIO) and the Canadian Food Inspection Agency (CFIA) to jointly create genomics and DNA barcoding tools to improve species identification for early detection of plant pests and mislabelled seafood.

The federal support is also intended to strengthen ties between CFIA and BIO scientists, update regulatory programs and prevent invasive plant pests from entering Canada.

The CFIA will contribute \$323,000 over 18 months to support the initiative.

Canada is at the forefront of genomics and DNA barcoding for species detection and identification, key to ensuring safe and accessible food



From left: Lloyd Longfield, Guelph MP; Malcolm Campbell, vice-president (research) at U of G; Jane Philpott, federal minister of health; and Bruce Archibald, CFIA president

and adequate plant protection, Philpott said.

“These projects demonstrate our commitment to using the best science to deliver evidence-based results that Canadians expect from our regulatory institutions.”

Malcolm Campbell, U of G’s vice-president (research), added: “We look forward to the exciting outcomes of this world-class scientific collaboration.”

UNIVERSITY
of GUELPH

CHANGING LIVES
IMPROVING LIFE

www.uoguelph.ca/cbs

New Dean Gets to Know CBS

IT'S BEEN A busy eight months. I took over as dean of CBS last August and I have spent the time learning the culture and dealing with the myriad of administrative details it takes to run the college. I've had the pleasure of reading the names of the graduates at three CBS convocation ceremonies and welcomed several hundred more alumni to the CBS family.

In my meetings with alumni, particularly those who graduated "less recently," it struck me that the college and the curricula have changed a great deal, and that you may be at a loss to see yourselves in the current college structure. So we dug through the records and created the figure below to help you track the evolution of your major. I hope you find it useful; I have certainly found it interesting.

In college news this past year I'm pleased to tell you about two new initiatives. In autumn 2015, we received approval from the University Senate to offer a new master's degree in biotechnology. This unique, three- or four-semester M.Sc. degree is a partnership between the College of Biological Science and the College of Business and Economics. With an exciting course of study, we seek to prepare graduates for jobs in this burgeoning and rapidly evolving field of work.

We also launched the CBS Office of Educational Practice and Scholarship. There is a lot of research about best practice in higher education, but the most relevant research is discipline specific and tailored to the unique environment in which it will be applied. The office will help the college

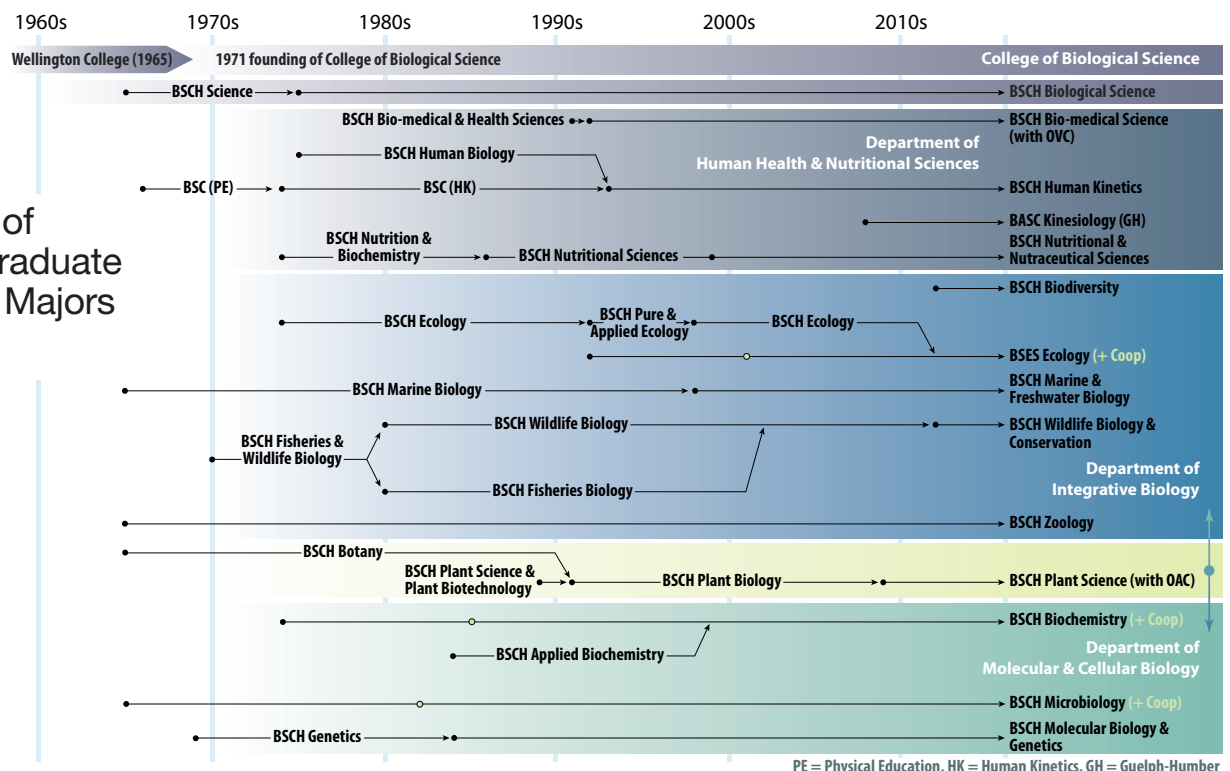
identify best practices for biology education at Guelph.

In sad news from the college, I am sorry to report that CBS alumna Grace Glofcheskie, B.Sc. '13 and M.Sc. '15, was tragically killed in December. The Department of Human Health and Nutritional Sciences established a heartfelt memorial wall to Grace, and the Glofcheskie family has established a memorial fund to create a scholarship in Grace's name (www.alumni.uoguelph.ca/grace). Grace was 24 years old and a much loved part of the CBS family.

Looking forward, I hope to see many of you at Alumni Weekend, June 10 and 11, or at one of the other alumni events throughout the year!

JONATHAN NEWMAN, CBS DEAN

History of Undergraduate Degree Majors in CBS



CBSAA Looks to Past and Future

AS WE MOVE through the first few months of 2016, we reflect on the year that has passed for our College of Biological Science alumni. We saw Michael Emes leave his role as dean and Jonathan Newman begin his five-year term on Aug. 1. We also had the great fortune to have Valerie Sharman, B.Sc. '94, return to the role of president of the CBSAA.

On a sad note, CBSAA member Grace Glofcheskie was killed in a hit and run accident in Guelph in December 2015. She began volunteering with us in 2012 while in the role of vice-president, academic and alumni affairs, with the College of Biological Sciences Student Council. Following graduation, she stayed involved with the CBSAA, working on the popular HK5K Run. Her presence will be missed.

We have already hosted our largest event of the year – CBS Career Night – in January. Thank you to all of the



CBSAA mourns the loss of Grace Glofcheskie who was killed in a hit and run accident in Guelph in December 2015.

fantastic graduates who came out to support our more than 150 undergrads as they start to investigate their career options. We are now looking forward to our annual alumni event at Royal Botanical Gardens on May 29 – watch your email for more information.

If you are interested in giving back to the college as a volunteer, please consider joining the CBSAA. We are always looking for more alumni to join our efforts in bringing meaningful events to our alumni friends and current students. In particular, if you are interested in building our presence through social media or assisting with photography at our events, please let us know. For more information about joining, please contact Annie Benko at abenko@uoguelph.ca.

KIM BRETZ, B.Sc. '97

CBSAA Scholarship Awarded to Student Volunteer

Contributing to a scholarship is one of many ways that alumni can help students. This year's recipient of the CBS Alumni Association scholarship is Esther Matus, a third-year biochemistry and co-op student who volunteers extensively both on and off campus.

"I was overwhelmed with gratitude and moved by the generosity of the CBS Alumni Association," she says. "The support that I received helps to not only further motivate my studies, but also allows me to focus on my campus involvement."



Esther Matus, left, and Valerie Sharman, CBSAA president

In addition to her studies and co-op placements, she volunteers with Co-Op and Career Services, the Biochemistry Student Association, Project Serve and Orientation Week. She also provides campus tours as a U of G ambassador.

"I am tremendously appreciative of this award," says Matus. "It not only reduces the financial burden, but it also recognizes my extracurricular involvement and inspires me to advance my leadership on campus and within the Guelph community."



Steph Swanson, left, and Alisa Campagnolo, both Grade 12 students at John F. Ross Secondary School in Guelph, study onion cells.

Let's Talk Science Opens Career Doors

USING ITEMS FOUND in most kitchens, local high school students learned how to extract DNA from a banana as part of Let's Talk Science, a national outreach program that promotes science to young people. Almost 50 U of G students and faculty volunteered at the event, which showcased the Department of Molecular and Cellular Biology.

For one of the experiments, high school students mashed a banana and mixed it with dish soap, salt and water to extract the DNA. They then poured the mixture through a coffee filter and added isopropanol to further isolate the DNA. Another lab taught students about osmosis as they applied salt to an onion cell and watched how it caused the cell to expel water under a microscope.

"We're trying to promote science in general and keep them interested," says Brandon Wyse, M.Sc. '15, one of the co-ordinators of the event. "We want to let them know that science can be fun and hands-on."

As high school students decide what they want to do after graduation, studying science can help keep doors open to future career paths. Attending events such as Let's Talk Science gives them a taste of what studying science is like at the university level.

Exercise Can Help Reduce Muscle Loss

LOSING MUSCLE MASS is part of aging, which can lead to loss of strength, speed and power. Researchers at the University of Guelph are trying to understand why this happens and what can be done to protect muscles as we get older.

Prof. Geoff Power joined the Department of Human Health and Nutritional Sciences in fall 2015 to study the effects of aging on muscles.

The loss of muscle mass is known as sarcopenia. "If the muscle gets smaller, it produces less force," he says. Muscle quality also deteriorates with age, causing muscles in older people to behave differently than those in younger people, even if they have the same muscle mass. Power's research will focus on what's responsible for these changes at the molecular level.

He will also examine muscle mass in the very frail and compare them to masters athletes in the same age group. "These individuals are the crème de la crème of aging," he says of the masters athletes he studied in a collaborative project with McGill University. "When we look at their muscle properties, they seem to have a maintained number of motor units."

A motor unit consists of a motor neuron and the muscle fibres it activates, which make up the basic functional unit of contraction. More motor units mean more muscle mass and greater strength.

"Exercise is definitely an important contributor to functional performance," says Power. You don't need to be a world-class athlete, he adds, but staying active, even later in life, can help reduce muscle loss.



Staying active helps maintain muscle mass.

Research Aims to Boost Athletic Performance

By Julia Mirotta, SPARK

A NEW TOOL DESIGNED TO enhance performance in U of G athletes could pave the way for improved recovery and health.

Prof. Jamie Burr, Department of Human Health and Nutritional Sciences, is testing whether a technique called “external blood flow manipulation” can improve athletic performance and recovery. This process involves reducing blood flow to a muscle by applying a constrictive device that resembles a blood pressure cuff or tourniquet.

Constricting blood flow causes pooling in blood vessels below the cuff.

Previous research has shown that this action alone prevents loss in muscle strength and size.

Burr will use this device to test external blood flow manipulation in Guelph track athletes, recreationally-fit individuals, elderly people and those who are infirm and unable to exercise.

“Our early work suggests that through targeted training, we are able to alter the body’s adaptive response, bringing about changes in strength and muscle growth that might not otherwise be expected with relatively light intensity exercise,” he says.

By manipulating blood flow and applying electrical impulses to produce muscle contraction, Burr says some of the health benefits of exercise can

be achieved. Combining blood flow restriction with forced muscular contractions may produce gains in

muscle strength and size comparable to those achieved through more traditional resistance exercise.

Burr believes this research will lead to improved rehabilitation for bedridden patients, reducing their recovery times and

improving their quality of life.

External blood flow manipulation may also help treat other chronic diseases, such as diabetes, says Burr, citing evidence that altering muscle- and exercise-mediated hormones could help regulate blood sugar levels.

“This could have a big impact for people at risk for diabetes or diabetes-related complications,” he says.



Students from Corpus Christi Catholic Secondary School in Burlington, Ont., attended a human anatomy outreach program at U of G in fall 2015, thanks to a \$10,000-gift from biotechnology company Amgen. Fourth-year students in U of G’s human anatomy program led small group sessions on various body systems. “I thought the trip was very educational,” wrote one high school student in an evaluation of the program. “Seeing the different organ systems in real life and not just the textbook really helped me to understand the human body better.”

Kids Help Bugs Get Barcoded

ALMOST 300 SCHOOLS across Canada have participated in U of G's School Malaise Trap Program, which provides them with tent-like traps to collect flying insects outdoors. More than 68,000 specimens representing nearly 7,000 species have been sent to the Biodiversity Institute of Ontario (BIO) through the program, where they are then sorted, analyzed and imaged.

"It's a unique opportunity for students to delve into modern biodiversity science," says Vanessa Breton, school program co-ordinator.

Using a small piece of tissue from each specimen, the insects are identified using DNA barcoding, and the data is published on the Barcode of Life Data Systems (BOLD), which contains DNA barcode records from hundreds of thousands of species. So far, more than 1,000 species collected during the program were new to BOLD.

In some cases, schoolchildren have discovered insect species in areas where

they were not known to exist. Some of the species collected by the malaise traps have never been found in Canada before and are sent to regulatory agencies for further analysis to rule them out as agricultural pests.

Each school receives a malaise trap for two weeks in the spring or fall. Once the insects have been collected and analyzed, the school receives a list and image library of all species collected in their schoolyard. Students and teachers can record their observations on the program's blog; feedback has been very positive.

"Students realize how interesting science can be by contributing real data to the International Barcode of Life Project," says Emily Berzitis, research training co-ordinator at BIO.

The program is currently raising funds to help expand it to more schools in North America and around the world. If you're interested in donating, visit malaiseprogram.ca.



Connor Warne, a lab technician in the Biodiversity Institute of Ontario, studies insect specimens.

Squirrel Stress Linked to Unhealthy Microbiomes

RED SQUIRRELS LIVING in a low-stress environment harbour healthier communities of micro-organisms, a result that might hold implications for human health, according to a new U of G-led study published in the journal *Biology Letters*.

Researchers tested squirrel microbiomes and analyzed the animals' stress hormones.

Microbiomes are communities of micro-organisms living in and on the bodies of all living things, including people. Found in the mouth and gut and on the skin, microbiomes consist of a mix of beneficial and potentially harmful bacteria that changes constantly.

"A diverse microbiome is generally a good thing for your health – it's why people take probiotics," says lead researcher Mason Stothart, a former undergraduate student in the Department of Integrative Biology.

"We wanted to understand the relationship between the microbiome and stress. The greater the stress in the squirrels, the less bacterial diversity they had, which can be an indicator of poor health."

Stothart and a Laurentian University graduate student trapped squirrels in Algonquin Park in Ontario. They took mouth swabs and fecal samples, which were then analyzed in a lab.



Stress reduced the microbial diversity of red squirrels.

The researchers found that microbiomes were more diverse in squirrels with lower stress hormones.

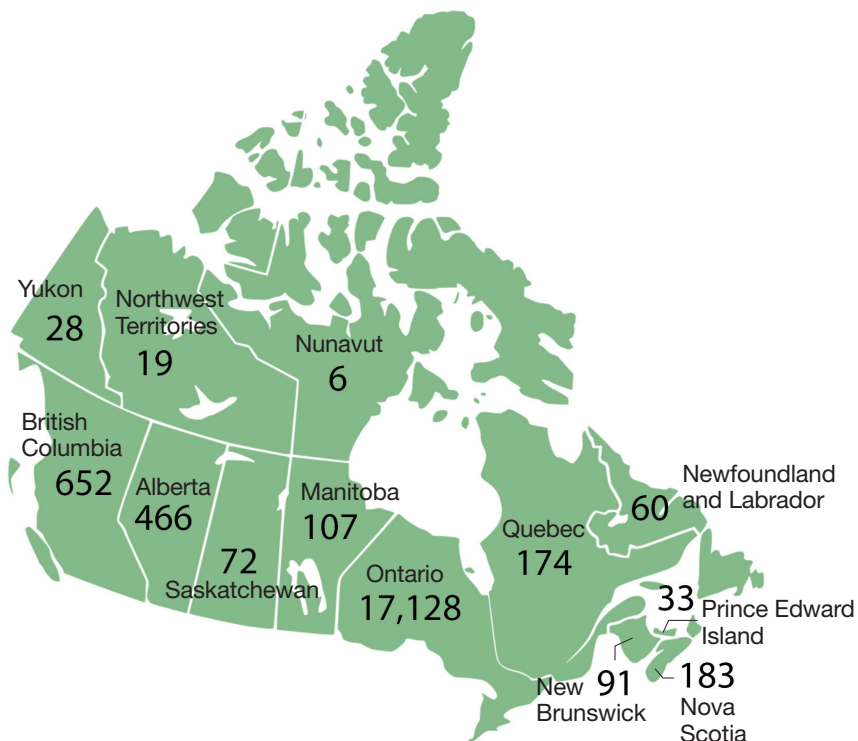
“As a second part of the experiment, we captured the same squirrels two weeks later, and found that if stress levels increased, some bacteria that are potentially harmful also increased,” said Stothart.

This study is the first of its kind to be conducted in a natural environment, says Prof. Amy Newman, senior author of the study and Stothart’s supervisor.

“This is the first demonstration that there is a link between stress and microbiome diversity in the wild,” Newman says. “Conducting this study in a natural environment provides a more realistic look at the microbiome and its potential link to stress and health.”

The researchers now plan to vary the microbiome to see whether it’s impacted by stress, or the other way around, said Newman.

How many CBS grads live in your province or territory? Check out the map to find out!



The first CBS Awards ceremony was held in fall 2015 to honour CBS student award winners and the donors who support these awards in the college. About 85 people attended the event, including students, faculty, alumni and donors. If you are interested in contributing to a CBS student award, please contact Annie Benko at abenko@uoguelph.ca.



Grad Gets Physical

IF YOU WANT to get in shape this year, look to Ibrahiem El Salti for inspiration. The 2016 biology grad is a physique competitor who placed in the top five in three provincial competitions last year. Unlike body building, physique focuses on a more natural appearance. Judges look for body symmetry, proportion and stage presence.

El Salti began physique training in his first year at U of G when his father passed away. “I started noticing that I was dealing better with the situation by being physically active,” he says. “That pushed me to have a vision in my head and go for it.” He found that working out made him feel good both in and out of the gym.

He will compete in the Toronto Pro SuperShow in June.

His training consists of one hour and fifteen minutes per day, five days a week. “It’s a lot of focused, slow weightlifting,” he says. “I tend to think of it as meditation. My breathing is always key: six seconds in, six seconds out.” He has

also worked with a national trainer in Jordan. “When you love something, you want to do anything to be good at it,” says El Salti.

Taking nutrition courses at U of G helped him learn which foods were the healthiest options for him. A course taught by human health and nutritional sciences professor Lindsay Robinson, called “Nutrition, Exercise and Metabolism,” was especially helpful, he says, because he learned more about the body’s nutritional requirements for physical activity.

Keeping up his social media profile is another big time commitment. He has more than 10,000 followers on Instagram (ib_aesthetics).

The rewards of physique competition extend beyond fitness. “It’s more about raising my dad’s middle name on stage,” says El Salti. “It’s a very big stage. You’re representing Ontario. To me that’s the ultimate goal. That’s the biggest reward that pushes me through every day.”

Upcoming Events

MAY 29

CBSAA Family Day at Royal Botanical Gardens

CBS alumni will enjoy free admission, a complimentary lunch and a brief lecture at RBG. www.alumni.uoguelph.ca/events

JUNE 10 AND 11

Alumni Weekend

Events include the UGAA Awards of Excellence Gala, the President’s Milestone Lunch, the Great Gryphon Race, Let’s Get Crafty Beer Tasting, Alumni Pub Night, Alumni Family Picnic, tours and much more.

Visit www.alumni.uoguelph.ca/alumniweekend for more information.

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