

Spring 2014

ZYGOTE PLUS



A newsletter for alumni of the College of Biological Science

Better Bagel, Better Health?

WHAT IF REDUCING YOUR RISK of developing Type 2 diabetes or colon cancer was as easy as eating a bagel a day? That's what researchers in the Department of Human Health and Nutritional Sciences are trying to find out as part of the "better bagel study."

Not just any bagel has these potential health benefits. The bagels being studied contain 20 grams of resistant starch, up to five times what people consume on average daily.

"Resistant starch is a type of dietary fibre," explains Prof. Alison Duncan, the study's director. The study aims to determine whether resistant starch can reduce the body's glycemic response.

Resistant to digestive enzymes, the starch slows down digestion, making food travel more slowly through the digestive tract and reducing the body's absorption of glucose. It's not easy to get enough resistant starch from your diet, because it's found in a limited number of foods.

"Overall dietary fibre intake is low as well," says Duncan. Since resistant starch spends more

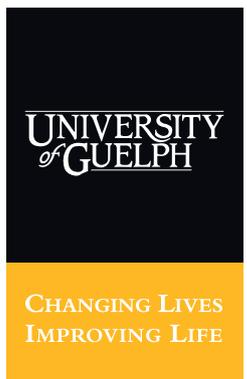


Sarah Dainty, left, and Prof. Alison Duncan

time in the large colon, it ferments, producing "gut-healthy compounds," which are believed to reduce the risk of colon cancer.

The resistant starch being studied comes from maize developed by the Department of Plant Agriculture. "We're turning the crop into a functional food, and now we're testing it in a human clinical study," says Sarah Dainty, a master's student working with Duncan.

To learn more, email bagel@uoguelph.ca.



www.uoguelph.ca/cbs

Donors Make a Difference

THE BETTERPLANET PROJECT has provided CBS with a strong foundation for our human health initiatives to continue well into the future. Thanks to the generous support of our donors, CBS has already implemented some of these initiatives, while fundraising efforts for other projects will continue beyond the formal campaign closing date.

The Health for Life Initiative is a world-class program focused on preventive strategies to maintain good health and reduce the incidence of chronic diseases in society.

One project that is already underway is the Guelph Family Health Study, which will examine how nutrition, exercise and lifestyle changes can improve family health.

The study will start this spring with 50 families that have at least one child between 18 months and five years of age, and will expand to 3,000 families in six years.

For more information, visit www.guelphfamilyhealthstudy.com.

Another CBS initiative is the



Giving for Life fundraising campaign in support of a new Human Anatomy Learning Centre, which launched in February.

Our goal is to build a new facility that will include labs for embalming, prosection and plastination, a museum and classroom space that will support the 2,000 students who benefit from this incredible learning experience.

Join me and make a gift, tell us your story and tell a friend at www.givingforlife.ca.

I look forward to sharing more updates with you in the future.

MICHAEL EMES

DEAN, CBS

Technology Boosts DNA Barcoding

A faster, cheaper way to capture more information about nature's diversity is the main benefit of next-generation technology described by a team of researchers including U of G biologists in a paper published in *Molecular Ecology Resources* in February.

The group has shown that next-generation sequencers plowing through numerous genetic samples at a time may vastly improve DNA barcoding technology developed at Guelph and used worldwide to catalogue life on Earth, says co-author Prof. Mehrdad Hajibabaei, Department of Integrative Biology. He belongs to U of G's Biodiversity Institute of Ontario.

Massively parallel sequencing allows researchers to analyze DNA samples much faster than conventional sequencing technology that examines one sample at a time. "This is a technological advancement in producing DNA barcodes or genetic information from single specimens," he says.

The Guelph-based International Barcode of Life project is the largest-ever project in biodiversity genomics, involving more than 1,000 researchers in 26 countries. Those researchers are using a telltale piece of genetic material to identify individual species of animals, plants and fungi.

Hajibabaei's lab has used next-generation sequencing to identify organisms collected in bulk samples of water or soil used to monitor the health of ecosystems.

The BetterPlanet Project

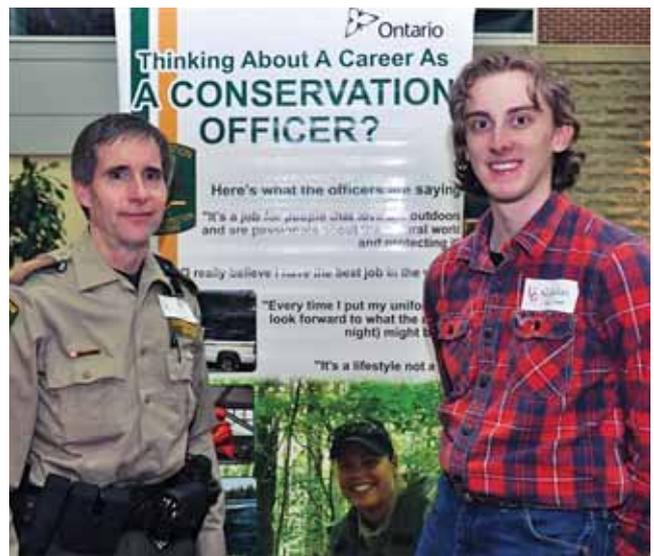


CBS Career Night Draws Alumni and Students

REGARDLESS OF THE WEATHER, Dan VanExan spends about 90 per cent of his time outdoors. As a conservation officer for the Ontario Ministry of Natural Resources (MNR), he's responsible for protecting flora and fauna as well as public safety.

"We're like police officers in the bush," says VanExan, who graduated from U of G in 1980 with a B.Sc. in fisheries and wildlife. Conservation officers enforce 30 pieces of legislation that pertain to wildlife and natural resources, he adds. "A lot of our victims are unable to speak for themselves."

Now based in Tweed, Ont., he works with several colleagues who are also Guelph grads. The winter weather didn't stop him from driving for three hours to Guelph to meet with students during the annual CBS Career Night in January. His son, Nicholas, a fourth-year zoology and history student, also attended the event.



Dan VanExan, left, and Nicholas VanExan

In his second year at U of G, Dan was hired for a contract position with the MNR. That experience eventually led to a full-time job. He advises current students to get as much work experience as they can before they graduate. Meeting with potential employers can also help students stand out from the crowd of email applicants, he adds.

Get Involved With CBSAA

ALTHOUGH THE WINTER was snowy, icy, windy and even rainy, the CBS Alumni Association (CBSAA) did not slow down. Our annual CBS Career Night was another huge success. Thank you to all of our CBS alumni and staff who participated. It was great to see so many new and returning alumni in the crowd in addition to Guelph's interested and keen students.

We also had the pleasure of seeing the first CBSAA Student Scholarship awarded to biomedical science student Sophie Kloppenburg at the University-wide awards ceremony in February. As the monetary burden for

students keeps going up, it's fantastic to see our alumni association giving back and helping our current students.

This spring is turning out to be our most exciting ever. Our most popular event, the Royal Botanical Gardens lunch and tour, will take place in May, and we will hold our AGM during Alumni Weekend in June. All CBS alumni are encouraged and welcome to attend both events.

There are lots of great reasons to take part in Alumni Weekend. Besides the usual events, this year brings back the Conversat Ball, a great opportunity to celebrate the University of Guelph's 50th anniversary. Invite a group of your CBS friends and book a table.



Kim Bretz

For more information about these events, our meeting schedule, or to get involved with your alumni association, please contact Diane Wiles at dwiles@uoguelph.ca.

KIM BRETZ, B.Sc. '97
CBSAA PRESIDENT



Fundraising Supports Growth

THE HUMAN ANATOMY program at U of G has launched a \$4-million fundraising campaign to build a Human Anatomy Learning Centre that will help accommodate its growing numbers of students and donors.

“The new anatomy building will secure the future of our anatomy program for the next 50 years,” says CBS dean Michael Emes. The proposed facility will allow the program to become fully self-sufficient, with laboratories for embalming, prosection and plastination.

Almost 400 undergraduate students in human kinetics and biomedical science take anatomy dissection courses annually, and another 1,500 take prosection courses. Students often pursue careers in various health-care fields, such as medicine, dentistry, nursing, physiotherapy and kinesiology.

The program also teaches about 2,700 health-care professionals, as well as college and high school students, each year.

To donate or to learn more, please visit www.givingforlife.ca.

DNA Helps Researchers Track Animals



Frances Stewart

AFTER BEING HUNTED almost to extinction during the fur trade, fishers are now making a comeback in parts of Alberta. But earlier attempts to reintroduce the second-largest member of the weasel family have been mostly unsuccessful.

“The majority of fisher reintroduction attempts that occur across North America don’t work,” says Frances Stewart, B.Sc. ’09 and M.Sc. ’12, who is studying fisher populations for her PhD at the University of Victoria. Researchers want to know why reintroduction efforts in the 1990s were successful.

As part of her fieldwork, Stewart is studying an area that extends from Elk Island National Park to Miquelon Lake Provincial Park in central Alberta. “We believe that the animals that are here are from that initial reintroduction attempt in the ’90s.”

She is collecting DNA samples from the animals using non-invasive traps, which consist of a tree trunk wrapped in barbed wire with a piece of frozen beaver meat attached on top. As the fisher climbs the tree to reach the bait, its fur gets caught on the barbed wire.

The research team is using the fur for DNA analysis to identify individual fishers and determine whether they’re related. “All individuals have a unique genetic code, despite what species they are, so we’re also able to identify individuals that visit the site,” says Stewart. A camera set up on a nearby tree takes a photo of each animal.

The DNA samples will also show how the animals’ genes have spread across the area. “Not only are you able to find out how the animals move around the landscape and where they’re located but also how they’re related.”

Nutritionist Offers Health Tips

WHAT DID YOU EAT TODAY? If you're Julie Bednarski, B.Sc. '08, you probably ate a salad.

"I love salads," says the registered dietitian and nutritional consultant. "They can be done in a million different ways."

As the founder of Whole Living Kitchen, Bednarski provides nutritional consultations to individuals, schools and corporations. Having studied applied human nutrition at U of G, she wanted to combine her passion for nutrition and educating the public about healthy eating habits.

Her main goal is to get people to eat more whole foods and less processed foods. "It's hard to get everything you need in a supplement," she says. "Nutrients need to be combined. An apple has all the vitamins and minerals it needs."

Bednarski's clients invite her into their homes to give their kitchens a healthy makeover. She also takes them grocery shopping, teaches them how to read labels and recommends which foods to buy based on their



PHOTO BY ROHAN LAYLOR

health needs.

Whenever possible, she buys locally grown fruits and vegetables. "If Mother Nature made it, it's good for you," she says, adding that frozen fruits and vegetables are a good alternative to fresh produce when it's not in season. She recommends avoiding processed and canned foods because of their preservatives and sodium content.

Lack of time is often why busy people don't eat well or skip meals. Instead of heading to the food court for a high-fat, high-sodium meal, Bednarski says, prepare healthy meals and snacks ahead of time. Her favourite snacks include fruits and nuts. Getting children involved in meal preparation can help them make healthy food choices.

Julie Bednarski

Research Opportunities Help Students Learn



Carly Spraggett

READING JOURNAL ARTICLES is one way to learn about research; working on a study as part of an undergraduate student research assistantship (USRA) is another.

For Carly Spraggett, B.Sc. '14, the opportunity to work with Prof. Alison Duncan, Department of

Human Health and Nutritional Sciences, gave her first-hand experience in conducting a research study.

In summer 2013, she looked at how vitamin D supplementation in cheese affected diabetes risk.

"It was an incredible learning experience," says Spraggett, who studied applied human nutrition.

She worked on a research team with two master's students. "I was involved in all aspects of the study," she says, from recruiting and screening participants to collecting data through questionnaires and blood samples.

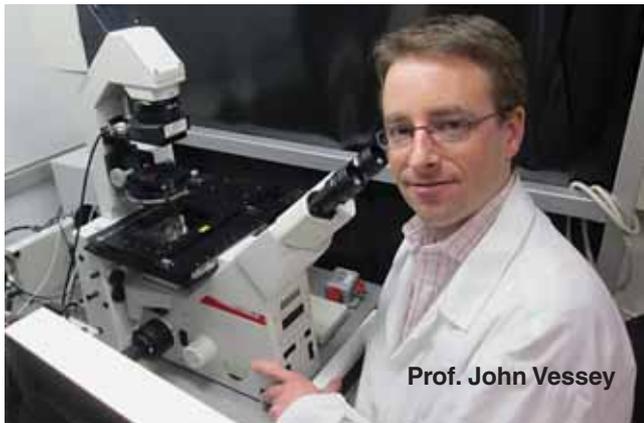
Now that Spraggett has graduated, she says she can apply what she learned as a research assistant to her own career

aspirations, which include becoming a registered dietitian.

"These programs can make all the difference for students by involving them in scientific discovery and providing added preparation for post-graduate work and studies," says Brian Husband, integrative biology professor and associate dean (academic). "Through the various assistantships, students are involved in diverse activities, from field collections of biological diversity to wildlife biology, and molecular and physiological aspects of animal and human health."

The USRA positions run from May to August.

MCB Welcomes Four New Profs



STARTING A NEW JOB can be a nerve-racking experience, but Prof. John Vessey finds himself in good company. Vessey is among four new faculty who joined the Department of Molecular and Cellular Biology (MCB) in 2013. He says he was drawn to the diversity of research conducted at U of G.

"I'm very attracted to the fact that there's a vet school across the street, which offers me a lot of opportunities for collaboration," he says.

Before joining U of G, Vessey held a postdoc at the Hospital for Sick Children in Toronto, where he studied neural stem cells. "I'm interested in brain development," he says. "I'm interested in how the stem cells of the developing brain go about producing both the neurons and glia that end up forming the complex organ that is our brain."

Vessey studies embryonic brain development, which happens both before and after birth. He says many diseases that affect the brain can be traced back to a defective X chromosome. These types of diseases are more likely to affect males because they have only one X chromosome.

"Understanding the disease process is probably the most immediate impact of my research," he says, adding that his work could lead to better treatments.

Vessey will spend the next several months setting up his lab in preparation for his first class of students this fall. He hopes to inspire them in the same way his own mentors inspired him throughout his academic career. "I look forward to imparting that enthusiasm onto my future graduate students," he says, "and inspiring them to become good scientists."

HELPING TO CURE PARKINSON'S DISEASE and related disorders is the goal of new MCB professor Scott Ryan. Driven partly by family experience with Parkinson's, he's looking into cellular workings to learn more about causes and potential treatments.

His research focus is on cell signalling in the brain, or how neurons talk to each other. Neurons share neurotransmitter chemicals including dopamine and glutamate, stimulating nearby brain cells and strengthening connections needed for learning, memory and movement.

When dopamine-making cells die, the symptoms of Parkinson's appear, including tremors, stiffness and slowness, loss of balance and rigid muscles. There is no cure. Almost 100,000 Canadians have Parkinson's, a neurodegenerative ailment that affects voluntary, controlled movement.

More than eight out of 10 of those people are over 65. That age group is expected to double to about 23 per cent of the population in the next three decades, according to statistics from Parkinson Society Canada.

Brain neurons mature in mid-teens, but Parkinson's symptoms typically show up only around age 60, says Ryan. "At the point when you see tremors, they've already lost 95 per cent of their dopamine-making neurons."

He's interested in both genetic and environmental factors associated with the disease.

Both his grandfather and a great-uncle had Parkinson's. When his grandfather died in 1990, researchers had yet to pinpoint any genetic cause for the disease and lacked reliable models for studying it. "In the last 15 years, the progress that's been made in this disease is huge."





Prof. Tariq Akhtar

AS A CHILD, Tariq Akhtar wasn't fond of tending his mother's garden. Now that he's a professor, he has become an expert in plant biochemistry, studying chemicals that help plants survive.

"I'm fascinated by how plants respond to their environment," says Akhtar. "The underlying chemistry they do allows them to deal with a changing environment. Unlike people who can run away from noxious environments, plants are rooted to the ground and have to be clever to survive in some of the most incredibly challenging environments on Earth."

He studied plant metabolism during a postdoc with Eran Pichersky at the University of Michigan.

For a long time, scientists viewed secondary metabolites as waste products of living things. Now biologists see these substances – called specialized metabolites – as useful in helping plants survive predatory and environmental challenges.

At Michigan, Akhtar looked at terpenes, or volatile compounds that make up one of the largest known groups of secondary metabolites.

These are substances that lend scent to plants. "You encounter terpenes every day," he says. They're what make the tomato plant on his windowsill smell like a tomato.

Those scents often attract pollinating insects and other organisms, but plants also use terpenes for the opposite function. For certain insect pests, those metabolites can cause sickness and even death. The plant has evolved those terpenes to thwart predators – an example of how plants handle threats.

He's interested in the basic biochemistry, including

identifying and learning about the genes responsible for making these substances.

"I think Guelph is the premier agricultural school in Canada," says Akhtar. "It has a strong presence in plant biology and biochemistry."

JAMES UNIACKE is a cancer cell's worst nightmare. The new MCB professor is studying how cancer cells survive in low-oxygen environments, which could lead to new treatments aimed at destroying them.

Adapting to stress is key to a cancer cell's survival. "Much like people, stress affects cells on a daily basis," he says. Cells experience stress in the form of environmental factors, such as temperature, pH levels or lack of nutrients.

"My work ties into cancer because a tumour is a very stressful environment," he says, adding that tumour cells must cope with low pH levels and inadequate oxygen and nutrients. "In this sort of environment, a normal cell would die, especially when it's exposed to prolonged conditions like this. Cancer cells adapt quite nicely."

The main stressor he will study is lack of oxygen, also known as hypoxia. "Hypoxic tumours are actually very aggressive, so we're trying to prevent cells from adapting to hypoxia," says Uniacke. Since most types of cancers form hypoxic tumours, learning how these cells adapt and survive within a low-oxygen environment can help researchers develop strategies to prevent them from doing so.

"If we can come up with a treatment that could equally treat 95 per cent of cancers, that's pretty great."



Prof. James Uniacke

Grad Helps Catch Criminals

IF YOU'RE A FAN OF CRIME SHOWS, keep in mind that what you see on TV isn't typically what happens in real life. Most crimes, for example, aren't solved within an hour, minus commercial breaks. Another inconsistency is that these shows often depict a crime being solved by a small group of people, when in reality dozens of law enforcement staff and scientists could be working together on a case.

"They never portray the time frame properly or the number of people involved," says Gregg LaBerge, B.Sc. '91, director of the forensics and evidence division at the Denver Police Department. "Every person you see on television represents a team of 10 to 12 people."

LaBerge oversees the collection and analysis of evidence from the crime scene to the courtroom. His staff investigate everything from property crimes to violent crimes. The department works on about 12,000 to 16,000 cases per year, the majority of which are drug cases, followed by property crimes such as break-ins and car thefts. Each case involves documentation of what happened, taking photos and measurements at the crime scene, and collecting evidence.

LaBerge says the number of cases his department works on doesn't leave much time for celebration whenever a case is solved, but it's always rewarding. "You're contributing to the betterment of your community," he says.

Solving crimes is a team effort involving staff in a variety of scientific



Gregg LaBerge

disciplines, including DNA analysis, fingerprinting, firearms, computer forensics, video surveillance, toxicology and chemical analysis. If investigators have no leads in a case, they can turn to national databases that may contain potential matches.

Despite the difficult and sometimes gruesome nature of the work, LaBerge says regular exposure to crime scenes over the years helps his team cope. "That's something you get used to through repetition," he says, adding that dealing with grieving family members and cases involving children can be particularly difficult.

Originally from Sault Ste. Marie, Ont., he studied molecular biology and genetics at U of G. "The quality of education was second to none," he says. "It served me well in my career and put me ahead of my peers." LaBerge has been appointed to teach medical genetics at the University of Colorado Anschutz Medical Campus, where he earned a PhD.

Upcoming Events

JUNE 20 TO 22

Alumni Weekend

www.alumni.uoguelph.ca/events

JUNE 21

Conversat Ball

SEPT. 20

Homecoming 2014

Zygote Plus

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CBS Contact:

Diane Wiles

Alumni Advancement Manager

519-824-4120, Ext. 54568

dwiles@uoguelph.ca

Sonia Mancini

Senior Development Manager,

CBS

519-824-4120, Ext. 56384

mancinis@uoguelph.ca

Susan Bubak

Editor

519-824-4120, Ext. 56581

s.bubak@exec.uoguelph.ca

Contributors:

William Albabish

Andrew Vowles