

Summer 2016

ZYGOTE PLUS



A newsletter for alumni of the College of Biological Science

Discovery improves cell knowledge

OXYGEN IS ESSENTIAL to our survival, but it also plays a role in cancer cell growth. These cells often grow – and thrive – in low-oxygen environments found inside the body’s internal organs. Recreating those conditions in the lab can help researchers understand how cancer cells grow and adapt to hypoxia (low oxygen).

“Many diseases create hypoxia, especially tumours,” says Prof. Jim Uniacke, Department of Molecular and Cellular Biology. He describes tumours as “dense masses of cells” that oxygen can’t penetrate, creating malignant cancers that don’t respond well to chemotherapy or radiation.

The oxygen level inside tumours is just one per cent, compared to about three to six per cent in organs and 21 per cent in the Earth’s atmosphere.

Uniacke and PhD student Sara Timpano found that growing tumour cells in a low-oxygen chamber recreates the body’s physiological environment



Prof. Jim Uniacke with PhD student Sara Timpano

and causes them to behave differently than cells grown in the typical atmospheric conditions found in a lab. “It’s not representative of the oxygen being delivered to cells in our body,” he says.

One of the differences they saw was that cells growing in low oxygen synthesized proteins differently than cells exposed to atmospheric air. Labs already try to replicate the body’s internal environment by growing cells at body temperature using nutrients found in the body, but “oxygen has been neglected,” says Uniacke.

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Dean looks back on first year

HELLO ALUMNI! IT'S been an exciting year for me as I complete my first year as dean of this great college. As we look forward to the start of a new year, I thought I'd take this opportunity to highlight some news and events from the year gone by.

I'm pleased to announce two new initiatives for the college. In conjunction with our partners in the Ontario Veterinary College and the College of Social and Applied Human Sciences, CBS is proposing a new undergraduate program in neuroscience. This new B.Sc. program will complement Guelph's already strong neuroscience minor and our growing interdisciplinary M.Sc. and PhD programs in neuroscience.

And in a collaboration with the College of Business and Economics, this fall we are launching a new master of biotechnology. The program blends coursework in biotechnology with courses in innovation management, business and entrepreneurship.

I'm also pleased to announce that

Prof. Brian Husband, Integrative Biology, will begin a second term as associate dean, academic, for the college, and that Prof. Lawrence Spriet will begin a second term as chair of the Department of Human Health and Nutritional Sciences.

In April the college embarked on a strategic planning exercise to establish our goals for the next 10 years. I encourage any of you who would like to share your thoughts on the future of the college to email me at jonathan.newman@uoguelph.ca. I look forward to sharing the outcome of our planning with you in a future edition of this newsletter.

Our CBS alumni have had many fascinating achievements this past year.

Dr. Neil Embleton, B.Sc. '83, DVM '87, invented a new treatment for cruciate ligament injuries in dogs called Simitri Stable in Stride.

Alexandra Hampson, B.Sc. (HK) '85, completed a new research study showing that spinal stability from an appropriate core exercise regime can



limit further predisposition to injury and improve performance for both horse and rider.

In development news, the family and friends of Grace Glofcheskie, B.Sc. '13, M.Sc. '15, who was tragically killed in a hit-and-run incident in late 2015, have endowed the Grace Olivia Glofcheskie Memorial Scholarship for the benefit of CBS student leaders.

In closing, I hope to see many of you at Homecoming Weekend Sept. 24 and the HK5K.

JONATHAN NEWMAN, CBS DEAN



Grace Pitman received 3,500 YouTube hits for her video about monarch butterfly habitat selection. The master's student in integrative biology was a runner-up in NSERC's Science, Action! Video Contest in which university students were invited to create 60-second videos about various research topics. The video that received the most views on YouTube by the contest deadline was declared the winner.

Pitman studies why monarch butterfly populations have declined along with milkweed, the butterfly's larval host.

CBS launches CoESP

HOW DO STUDENTS learn, and how can their instructors help them learn? Those are some of the questions that the new CBS Office of Educational Scholarship and Practice (CoESP) aims to answer.

“It’s a direction we want to go in,” says Prof. John Dawson, director of CoESP, explaining that not many universities have a dedicated office for educational research and evidence-based teaching practice. The office will explore topics such as curriculum design, academic advising and career counselling.

“We exist to improve student learning, to communicate and promote education-based learning, develop learning outcomes and ways of assessing them, and contribute to literature on educational research,” he says of CoESP. The office also includes a steering committee made of faculty, staff and students.

Planning for the new office began in fall 2015. Dawson, a molecular and cellular biology professor, joined the search committee to hire a director for CoESP, but then decided to apply for the position when he realized he possessed many of the search committee’s criteria.

Prof. Brian Husband, also in the Department of Molecular and Cellular Biology and associate dean, academic, describes Dawson as a “logical person” for the position because “he’s one of the leaders on this topic in the college.”

The college also hosts a peer consultation group in which faculty meet to share their successes, discuss their challenges and develop their teaching skills.

“The way students learn is changing,” says Husband. “We need to grow with that, take a closer look and understand how students learn.”

Students invent healthier burger

Given the choice between eating pulses (beans, chickpeas, lentils and peas) or a burger, most non-vegetarians would probably choose the latter. But what if you could combine pulses with ground meat, turning it into a healthier, tastier summer barbeque staple?

Fiberger is a pulse-based meat enhancer that adds fiber, protein and nutrients while reducing fat and cholesterol in a typical burger. One serving contains more iron than a beef burger and 55 per cent of recommended daily fiber intake.

Developed by Caileigh Smith and Evelyn Helps, fifth-year nutritional and nutraceutical sciences students, Fiberger won Pulse Canada’s Mission ImpULSEible competition in which post-secondary students were invited to develop new food products using pulses.

“We wanted to find a way of creating a product that would facilitate healthy, simple and affordable meals to be prepared at home,” says Smith.

Substituting part of a meat dish with pulses cuts down on meat consumption and cost. Burgers made with Fiberger also retain more moisture, making them easier to



Students Evelyn Helps and Caileigh Smith invented Fiberger, a pulse-based meat enhancer.

form and less likely to burn.

“Our friends and family were the guinea pigs,” says Smith. The students experimented with different ratios of pulses and spice blends until they found the winning recipe.

They will compete in an international pulse product showcase in Chicago this summer.

Prof developing new treatment for anemia

ANEMIA HAS MANY causes and plays a role in many diseases, such as cancer. The hormone responsible for stimulating bone marrow to produce red blood cells, called erythropoietin (EPO), was commonly thought to be produced by the kidneys – until Prof. Jeremy Simpson, Human Health and Nutritional Sciences, found another source.

“No one’s ever questioned it,” he says of the medical community’s focus on kidneys as the cause of anemia.

His research revealed the brain was a major producer of EPO in the body and that other organs were also capable of producing the hormone. “This changes one of the major tenets of physiology,” he says.

Anemia in hospital patients is usually not due to iron deficiency, he adds, making low EPO a more likely explanation. “We always think it’s the kidney but it could be the brain.”

Anemia affects about 75 per cent of cancer patients, but giving them EPO to help them produce more red blood cells may protect cancer cells from chemotherapy. Simpson’s lab is developing a new treatment for anemia that doesn’t protect cancer cells with the help of a student funded through the CIBC Undergraduate Summer Research Assistantship in Cancer Biology.



Prof. Emma Allen-Vercoe in her “smelly” lab.

Porcine probiotic may help protect gut health

PROF. EMMA ALLEN-VERCOE is used to the smell in her lab. “It’s not too bad today,” she says of the odour, but those who have never been to her lab before would probably plug their noses at the first whiff of her research subjects: fecal microorganisms.

The lab is best known for developing artificial fecal transplants for *C. difficile* patients, but it also works on projects that benefit animal health. One of the lab’s current projects is aimed at improving pork production.

“Antibiotics have been used as growth promoters but there is now pressure for farmers to remove antibiotics from their herds altogether,” says Allen-Vercoe. “This leaves the animals open to diseases that can be a huge problem for production.”

Antibiotics also reduce the diversity of gut microbiota, which can weaken the immune system, making pigs – and people – more susceptible to disease. Her lab is developing probiotics that could enhance the pigs’ microbial population by replacing missing bacteria that are beneficial to their immunity.

“In general my lab works on human health,” she says. “We look at microbes from very healthy individuals and put them together into ecosystems to treat disease. We feel that it’s a new wave of medicine. There’s nothing like this on the market but there will be soon.” Her lab is one of several that are working on microbial-based solutions to human health problems.

The lab is currently testing its new “microbial ecosystem therapeutic” on various types of diseases, such as *C. difficile*, ulcerative colitis, type 1 and type 2 diabetes, obesity, autism, depression and colorectal cancer to see how gut microbes affect disease and vice versa. “This research is all united by working on the human gut,” says Allen-Vercoe. “I can see that there’s a lot of commonality between some of these diseases whereas on the surface it may not seem that way.”



Remember the '80s? Here are some yearbook photos to remind you. 1. Pay phones have almost disappeared from campus. 2. Lab coats are still in fashion. 3. Spelling mistake? What spelling mistake? 4. Branon Plaza is still a popular meeting place on campus. 5. These students really love bio sci. 6. Students still dread exams.

Biologist-in-residence shares career expertise

IF EXPERIENCE IS the best teacher, the biologist-in-residence program in CBS provides students with the opportunity to learn from experts in their field.

“One of the intents is to create a venue for them to interact and share their knowledge with students,” says Prof. Brian Husband, Department of Molecular and Cellular Biology and associate dean, academic.

The biologist-in-residence teaches an undergraduate course and hosts guest lectures in the winter semester. Departments nominate candidates working in a wide variety of biology fields to introduce students to different career options.



Veterinarian Sherri Cox was a biologist-in-residence in winter 2016.

Invasive species not best conservation tool

HARNESSING AN INVASIVE fish species sounded like a promising conservation tool to help reverse the destruction wreaked by zebra mussels on endangered native mollusks in the Great Lakes – except that it won't work, says a U of G ecologist.

In a novel twist on invasive species ecology, a research team led by integrative biology professor Joe Ackerman found that the round goby fish – an invader in Ontario waters – only makes matters worse for native mollusks already driven to near-extinction by an earlier zebra mussel invasion.

The Guelph team's paper appeared in the *Royal Society Open Science* journal.



The invasive round goby fish

Ackerman worked with lead author and former master's student Maude Tremblay and Todd Morris, a researcher at Fisheries and Oceans Canada.

Nearly all indigenous mussel species in the Great Lakes have been largely wiped out by zebra mussels, an invader that arrived in the late 1980s.

Many scientists worried that the round goby would prey on endangered mollusks or out-compete native fish critical to the mussels' life cycle.

“Mussels need fish for successful reproduction. The larva has to attach to the gills or fins to develop into juveniles,” said Ackerman. He wondered

Veterinarian Sherri Cox, DVM '09, executive director, global development, innovation and research at U of G, and founder of the National Wildlife Centre, was a biologist-in-residence in winter 2016. She taught a course on wildlife rehabilitation that covered topics such as conservation biology, physiology and ecology.

“What I enjoyed most about teaching the biologist-in-residence program was working with an incredible, enthusiastic group of students,” she says. “Helping students learn about what wildlife rehabilitation is all about; having respectful and difficult discussions around ethical considerations; and watching the satisfaction and confidence they gained when working hands-on with wildlife in the various

whether the fish might help stave off extinction by serving as a new host for mussel larvae.

In the lab and in fieldwork, Tremblay compared development of mussel larvae on round gobies collected from the Grand and Sydenham rivers with larvae on the mollusks' customary fish hosts.

Although the larvae established themselves on round gobies, few developed into juveniles in the lab, said Ackerman. That means endangered mussels are further threatened by hampered reproduction on round gobies that essentially “wastes” larvae.

Limiting reproduction is a novel strategy for an invasive species, he said, adding that the study further underlines the need to control invaders in the Great Lakes.



3,000

The number of families who are being recruited to participate in the Guelph Family Health Study. Researchers will follow families with at least one child between the ages of 18 months and six years to help them develop healthy behaviours that can last a lifetime.

For more information and to register, visit www.uoguelph.ca/gfhs/.

labs were a few memorable moments.”

The course was so popular with students, it was filled to capacity.

Each winter the college selects a candidate to represent a different

department. To ease the transition from their work to academic life, the biologist-in-residence is provided with a mentor and opportunities to work with faculty and graduate students.



Students examine animal skulls as part of the Science Olympics at U of G. The volunteer-led program introduces high school students to science with hands-on activities and experiments.

Doctor plants rural roots

WHEN DR. ANNIE LU moved her family practice to Elora, Ont., she helped fill the need for doctors in rural areas and for doctors who understand the needs of the LGBTQ community.

A family doctor since 2008, she studied microbiology at U of G and attended medical school at the University of Toronto. Choosing a specialty wasn't easy.

"I enjoyed all aspects of medicine, so it was hard to pinpoint any one area," says Lu, B.Sc. '01. "Family medicine is so wide in the breadth and scope of things you can do. In rural practice, you do even more."

In addition to her family practice, she also works in the emergency rooms of rural hospitals. "You get to do more than you would in an office practice in an urban area."

Originally from Toronto, Lu did her residency in Mount Forest so she could be closer to her partner, who lived in Kitchener at the time. Her partner and their two young children (Lu returned from maternity leave in April) have since relocated from Waterloo to Elora.

Aside from Elora's small-town atmosphere and cultural scene, Lu was also



Dr. Annie Lu

drawn by the need for more resources for the LGBTQ community in rural areas. "Lots of people don't know if their providers are gay-friendly," she says. "They may have preconceived notions of LGBTQ people. There are certain health and preventive care issues that not all physicians consider."

Being open-minded and asking the right questions are key to helping these patients open up to their health-care providers, she adds. "Transgender is the next hurdle for people. If someone needs support, I want to make sure it's available."

Upcoming Events

SEPT 24

Homecoming

Zygote Plus

Published by the College of Biological Science

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Student wins top academic award

A PHD STUDENT IN CBS received the Forster Medal, U of G's top convocation award for graduate students, at the June 2016 convocation.

Named after the late Donald Forster, a former U of G president, the medal

recognizes academic achievement, leadership and citizenship.

Melanie Wills, a PhD student in the Department of Molecular and Cellular Biology, studies a cell signalling protein that may be implicated in human brain

tumours. She earned a curriculum innovation award for designing and teaching a first-year seminar course about science and media. She also founded the Canadian Lyme Science Alliance to increase awareness of Lyme disease, and improve diagnosis and patient care.

