

Fall 2017

# ZYGOTE PLUS



A newsletter for alumni of the College of Biological Science

## New initiative to fight Lyme disease

**L**YME DISEASE CUT short the life of Magnotta Winery co-founder Gabe Magnotta. Now the foundation created in his name has given \$1.4 million to the University of Guelph to help prevent and fight the debilitating disease.

The grant will create the G. Magnotta Lyme Disease Research Lab, intended to improve diagnostic testing and treatment to prevent long-term suffering from Lyme disease.

Magnotta, known as a trailblazer in the Canadian wine industry, co-founded Magnotta Winery in 1990 with his wife, Rossana Magnotta. An avid outdoorsman, he died in 2009 after a seven-year battle with Lyme disease.

Rossana Magnotta created the non-profit G. Magnotta Foundation for Vector-Borne Diseases in 2012 in her late husband's memory. "Over the years it has become a beacon of hope for the countless people who suffer from Lyme disease every day," she said.

The foundation aims to establish Canada's first research centre for vector-borne illnesses;

the Lyme disease lab at U of G is the first step.

"I believe the University of Guelph with its deep expertise in zoonotic diseases, its world-class researchers and its advanced technologies will deliver on the promise that drives our foundation donors to combat this terrible disease."

U of G scientists hope to identify disease biomarkers and prognostic indicators for Lyme disease, as well as new treatment options. The lab will operate within the College of Biological Science (CBS).

"I am very excited about this partnership between U of G and the G. Magnotta Foundation," said CBS dean Jonathan Newman.

"Lyme disease is a terrible affliction, and this laboratory will advance the ...continued on page 2



**Rossana and Gabe Magnotta**

# Dean's update

**H**ELLO ALUMNI! WE were saddened to hear of the passing of Professor Keith Ronald, founding dean of CBS (1971-1983). In addition to being an outstanding scientist, Keith demonstrated vision and leadership that were instrumental in positioning CBS for its future success. On behalf of CBS, we extend our heartfelt condolences to Keith's family and friends.

In March, I joined senior University leaders to meet with Deb Matthews, minister of advanced education and skills development. I spoke with the minister about CBS's initiatives in mapping the B.Sc. curriculum, the launch of our CBS Office of Educational Scholarship and Practice, our study of the use of high-impact teaching practices in undergraduate education and our outstanding undergraduate research experiences.

I had lunch with former zoology professor Mary Beverley-Burton. She supports the Dr. Mary Beverley-Burton Travel Scholarships. I also had lunch with Ken Gregory, chair of the former Department of Microbiology, and his wife, Marilyn. Ken and Marilyn established the Dr. and Mrs. Kenneth F. Gregory Scholarship, which recognizes two students enrolled in any major within the Department of Molecular and Cellular Biology who demonstrate strong academic performance and significant volunteer involvement.

Dr. Mitchell Sutton, B.Sc. '80, a practising dentist in the Toronto area, gave a lecture on dental anatomy to our human anatomy students. He's a fabulous and entertaining speaker. We



**Jonathan Newman**

are fortunate that he gives back to the college and the students with such energy and passion!

David Stephenson, B.Sc. '82 and M.Sc. '84, co-owner of Natural Resource Solutions Inc., met with CBS faculty to discuss possible research collaborations and opportunities for student experiential and work-integrated learning opportunities.

I also had dinner with Jackie Sinkeldam, B.Sc.(HK) '94, a local physiotherapist who owns Eramosa Physiotherapy Associates. She is a great friend of the human anatomy program and is committed to helping us expand it.

JONATHAN NEWMAN, CBS DEAN

...continued from page 1

Lyme disease research agenda for all Canadians.”

Lyme disease has spread from Ontario to every Canadian province. It's caused by the bacteria *Borrelia*, which is transmitted through bites of infected ticks.

Infected individuals initially experience flu-like symptoms. Left untreated, the disease can affect the skin and internal organs as well as the musculoskeletal system, and impair eyesight and hearing.

It's one of the most commonly misdiagnosed diseases, with symptoms that mimic other diseases such as multiple sclerosis, amyotrophic lateral sclerosis, and Alzheimer's and Parkinson's disease.

Even when the disease is diagnosed properly and early, patients often suffer new onset symptoms after treatment.

“Lyme disease is increasingly recognized as a substantial threat across the country, and there is a profound need for high-quality science that can improve the lives of afflicted Canadians,” said Melanie Wills, a research associate in the Department of Molecular and Cellular Biology who will direct the new lab.

A co-founder of the Canadian Lyme Science Alliance, she said, “As a researcher in the field of cellular pathology, I am passionate about uncovering mechanisms that drive human illness.”

Wills plans to work with other Lyme researchers and centres, and develop a national collaborative network involving scientists, clinicians and patients.

“It is an honour to work with the visionary G. Magnotta Foundation toward a shared goal of breaking new ground in the understanding and treatment of this complex disease,” Wills said.

## Prof studies protein's role in brain diseases

**A**LZHEIMER'S DISEASE, SCHIZOPHRENIA and depression are distinctly different diseases. But all three involve a loss of cognition, and research by molecular and cellular biology professor Melissa Perreault has tracked a protein called glycogen synthase kinase 3 (GSK-3) that may be the cause.

"Essentially, I work on animal models of neuropsychiatric diseases, with a focus on cognitive functioning," Perreault explains. She conducts studies on rats to better understand the protein's role in the brain, and how increasing or decreasing the levels will change the rats' behaviours.

Perreault recently received funding from the Weston Brain Institute for new research that involves putting rats through a water maze while their brainwaves are recorded. "We use an algorithm to extract the individual frequencies," she says. "We also track how long it takes for them to get through the maze."

She then modifies the levels of GSK-3 in the rats' brains (using either a virus or medication) and sends the animals through the maze again, noting any changes in the rats' behaviour.

"What we are trying to do is better understand the link between this protein and cognitive decline, and then find a receptor mechanism to regulate the protein," she explains. "There's currently nothing that treats the cognition



**Prof. Melissa Perreault**

problems in these diseases. We have been spinning our wheels for a long time in this area."

While too much GSK-3 seems to cause problems, it can't be targeted directly because it also plays a role in some essential brain activities. Instead, Perreault is strategizing ways to change the cellular receptors for the protein.

"I am hoping for some exciting results," she says. "If we can treat cognitive dysfunctions in these diseases, it might also be applied to brain injuries or to the decreases in cognition that can be part of normal aging."

Perreault, who is Métis, is one of several Aboriginal faculty recently hired by the University of Guelph, and the only one studying biology.

## A day in the life of a CBS student

**W**ANT TO KNOW what it's like to be a CBS student? Check out students\_of\_cbsguelph on Instagram ([www.instagram.com/students\\_of\\_cbsguelph/](http://www.instagram.com/students_of_cbsguelph/)). A different student manages the account each week to show what their lives are like both in and out of the classroom. Find out what students are doing in their classes, research and co-op placements.

Pictured in the photo is Nia King, a



**CBS student Nia King**

fourth-year biomedical science student who has worked with Inuit communities in the Arctic to study how climate change is affecting their health. Her research is part of the Indigenous Health Adaptation to Climate Change

Project led by Prof. Sherilee Harper in the Department of Population Medicine in the Ontario Veterinary College.

"The communities have no road access, so transportation involves flying on tiny Twin Otter planes," writes King in her Instagram post. "If you ever have a chance to check out Northern Canada, I'd highly encourage it!"

The college also has a new Facebook page ([www.facebook.com/cbsguelph](http://www.facebook.com/cbsguelph)) featuring news articles, research findings, alumni events and more. Like us on Facebook to stay in the know.



## Following the leader not always best

**T**HERE'S SAFETY IN numbers for herd animals, but not if some members of the herd make poor decisions. That was one of the findings of research by Daniel Fortin, PhD '01, a biology professor at Université Laval, and University of Guelph integrative biology professor John Fryxell.

They studied the movement patterns of bison in Prince Albert National Park in Saskatchewan and found that those animals that ventured outside the park into neighbouring farmland were hunted, which contributed to the herd's population decline over a nine-year period from 2005 to 2013.

When bison that were once kept in paddocks in the park were allowed to roam free, that freedom came with unexpected consequences, says Fryxell. Their population size initially grew as they discovered new grasslands, but when they ventured into farmland adjacent to the park, they were often shot. Three times more bison were killed by hunters on agricultural land than died of natural causes inside the park.

"The bison developed a preference for plants in adjacent areas," he says, adding that the same crops that appeal to humans also attract bison. "The decline was unexpected. The

pattern of discovery of new pastures coincides with bison population decline."

He compares the herd's collective behaviour to "mob mentality." As rogue bison left the herd to explore greener pastures, others followed the leader. Although being part of a herd offers benefits such as protection from predators, in this case the herd was being led into danger.

"As these individuals sampled agricultural lands, they were exposed to new selective pressures" such as hunting, says Fryxell. "Animals, like humans, are very suggestible. That sometimes works to their detriment."

Instead of losing members of the herd to natural predators such as wolves, which often target young, old and sickly animals, healthy adult bison were being targeted by farmers who shot any animal that ventured on their property. "Mortality rates skyrocketed after an initial period of increase," says Fryxell.

Before humans began altering the landscape, animals could roam freely without the risks associated with human encounters. Now that people live on the outskirts of the park, any bison that venture past the park's perimeter are unknowingly putting themselves at risk.

"When animals are unwittingly attracted to something that's not good for them, we call that an ecological trap," says Fryxell. While animals' instincts drive them to keep searching for new food sources, their explorative nature could lead them into dangerous territory.

Fences aren't the answer, he adds, especially for herd animals such as bison, whose survival depends on constantly finding the best grazing areas. If they stay in one place for too long, the land won't be able to sustain them and they'll starve.

"Being able to move is a benefit to the resources they're feeding on and the animals feeding on them," says Fryxell.



# Gut microbes offer clues to illness

**T**HE SECRET TO saving the lives of some vulnerable preterm babies may be in their poop. University of Guelph professor Emma Allen-Vercoe, Department of Molecular and Cellular Biology, is using stool samples from preterm infants and the “robo-gut” in her lab to uncover the causes of necrotizing enterocolitis (NEC), a life-threatening illness.

About 12 per cent of preterm babies will become sick with NEC, and of those more than 30 per cent will die, according to a study in *Advanced Neonatal Care*. Those who survive may have lifelong problems. Because the disease is so serious, finding the cause — and a cure — has been a goal for many researchers.

Early studies were disappointing because the disease couldn't be linked to a specific germ. But Allen-Vercoe says that's not surprising.

“Many of the diseases we are looking at now have more to do with how the microbes are behaving under a specific set of environmental conditions — for example, different diets,”

she says. “The key is to discover what in the environment is causing them to behave badly.”

She's collaborating with a neonatologist from the University of Chicago, who has taken stool samples from healthy preterm babies and identified which ones developed NEC and which babies didn't. The researchers are also using samples from Toronto's Hospital for Sick Children.

The neonatologist could identify the microbes in the stool, but nothing more. That's when she reached out to Allen-Vercoe.

“Here we can actually culture the microbes and feed them in the robo-gut,” says Allen-Vercoe, whose U of G lab focuses on the study of normal human gut microflora, both in disease and in healthy conditions.

The robo-gut is a piece of laboratory equipment that mimics the environment in the lower intestines, allowing researchers to see what happens when food or medications are added to the stool sample. Working with PhD student Sandi

## CBS Retirements

**T**wo faculty members will retire from the Department of Molecular and Cellular Biology this year. Prof. Peter Krell studies virology and Prof. Joseph Lam studies cystic fibrosis. The college is grateful for their many years of contribution and wishes them well as they enjoy a well-deserved retirement.

Yen, Allen-Vercoe is adapting this model to mimic the particular conditions of the premature infant gut.

Earlier studies have shown that when preterm babies are exclusively fed human milk, their risk of NEC is very low. Allen-Vercoe explains that human milk supports the microbes in the gut to produce the right metabolites. “There are components in human milk that are targeted to specific beneficial microbes,” she says.

Current testing is using the special formulas fed to at-risk newborns in hospital. Allen-Vercoe has fine-tuned the robo-gut to match the slow digestion rate of the preterm baby. She found the current formula feed yields excessive protein, which causes the microbes to react by fermenting the protein. If the model is correct, this could be a potential problem for premature infants, since the products of protein fermentation are often harmful metabolites.

“If we can understand what is causing NEC, we can guard against it and potentially save the lives of many babies,” she says.



**Prof. Emma Allen-Vercoe, far right, in her lab.**

# Get involved with CBSAA

**W**E HOPE YOU were able to attend some of the CBS Alumni Association's events this year. We're always trying to find new ways for alumni to get engaged with the college and stay connected.

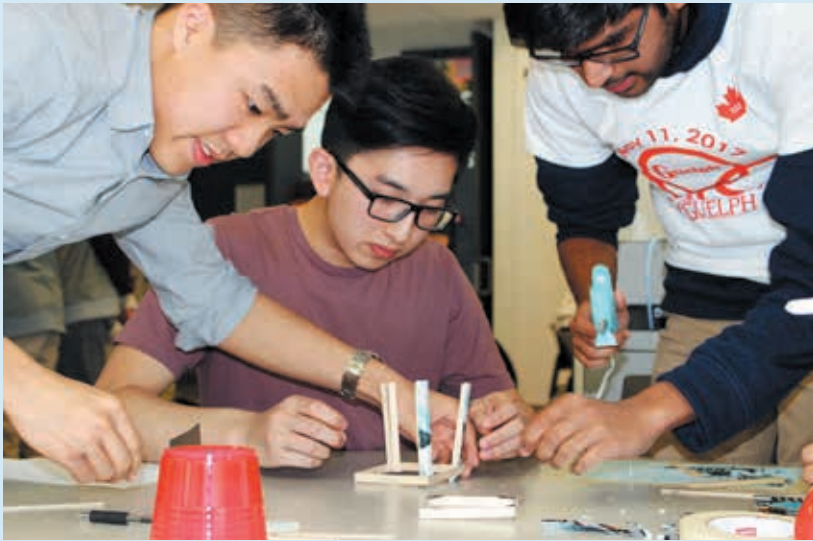
Earlier this year, we hosted the CBSAA Speaker Night, featuring Prof. Chris Perry, B.Sc. '02, M.Sc. '03 and PhD '08, who discussed his research on the role of muscle function in chronic diseases such as diabetes. He is currently an assistant professor in the Faculty of Health at York University.

Another popular event was CBSAA Family Day at the Royal Botanical Gardens in Hamilton, Ont. Prof. David Ma, Human Health and Nutritional Sciences, spoke about the Guelph Family Health Study, which looks at the impact of healthy eating and lifestyle choices on childhood obesity rates.

Alumni Weekend in June was a huge success, and we would like to thank everyone who attended. Congratulations to the human kinetics Class of '77, who celebrated their class reunion.

The CBSAA annual general meeting set the stage for us to launch our next round of alumni events. If you're interested in getting involved, contact CBS alumni advancement manager Taline Artinian at [artinian@uoguelph.ca](mailto:artinian@uoguelph.ca).

VALERIE SHARMAN, B.Sc. '94, CBSAA PRESIDENT



## Science Olympics makes learning fun

More than 1,000 high school students participated in U of G's Science Olympics in May. The event featured fun activities designed to get students excited about science. The challenges covered everything from animal, human and environmental biology to math, physics and engineering.

The Science Olympics is made possible by the generous support of Wellington Labs, Fisher Scientific and GreenMantra Technologies.

## Alumni in the news

**Harrison Brown:** *BCBusiness*



magazine named Harrison Brown, B.Sc. '10, to its 2017 "30 Under 30" list for his

work with HeadCheck Health, a company that developed a mobile app to help trainers and coaches identify potential concussions in athletes.

**Kris Lehnhardt:** Dr. Kris

Lehnhardt, B.Sc. '99, attending physician and assistant professor, Department of Emergency Medicine, School of Medicine and Health Sciences, George Washington University, made the Canadian Space Agency's short-list of 72 astronaut candidates vying for a shot at space travel.

**Teresa Mastracci:** Diabetes researcher Teresa Mastracci, B.Sc. '99, was named to the *Indianapolis Business Journal's* 2017 "Forty Under 40" list for her research that aims to develop new treatments for diabetes at Indiana University School of Medicine.

**Gregory Steinberg:** Dr. Gregory Steinberg, B.Sc. '98 and PhD '02, was awarded the Gold Leaf Prize for Outstanding Achievement by an Early Career Investigator by the Canadian Institutes of Health Research.

# CBS alumni reconnect at Alumni Weekend

Alumni Weekend was held on June 9-10, with more than 800 alumni and family members in attendance. In addition to holding the CBSAA AGM, we were thrilled to host the reunion of the human kinetics (HK) Class of 1977, who celebrated their 40th anniversary! It was wonderful seeing the renewal of old friendships and updating the class on what has changed on campus in the last 40 years.



CBS alumni and UGAA Alumni Medal of Achievement winners Gregory Brown (left, B.Sc. '11) and Mitchell Moffit (right, B.Sc.'10) with president Franco Vaccarino at the UGAA Awards of Excellence Gala.



The HK'77 class reconnecting at the Bullring.



The hairstyles and outfits may have changed, but the smiles are the same! The HK'77 class in the Powell Building, then and now.



More photos from Alumni Weekend may be found here: [www.alumni.uoguelph.ca/events/photo-gallery/alumni-weekend-2017](http://www.alumni.uoguelph.ca/events/photo-gallery/alumni-weekend-2017)  
**Interested in reuniting your class at Alumni Weekend 2018?** Contact Taline Artinian at [artinian@uoguelph.ca](mailto:artinian@uoguelph.ca) to find out how.



Valentine  
De L'Estoile and  
Gopal Thinakaran  
at the University  
of Chicago

## Researcher targets Alzheimer's disease

**M**ORE THAN A century has passed since German psychiatrist and neuropathologist Alois Alzheimer discovered a neurological condition that is now known as Alzheimer's disease. Today, the disease affects millions of people, and that number will continue to grow as the population ages.

Neurobiology researcher Gopal Thinakaran, PhD '92, is leading a group of researchers at the University of Chicago that is studying how Alzheimer's disease develops at the molecular and cellular level. Using cells from mouse models and human clinical samples, his lab aims to find a cure for the disease.

After completing his undergraduate and master's degrees in India, he says, "I knew I wanted to do research

for the rest of my life." Thinakaran then received fellowships from several universities in Canada and chose the University of Guelph.

He credits U of G for giving him a strong foundation in biology, which helped him forge his career path. "It prepared us for the challenges ahead so we could feel empowered to go where we wanted to go." He went on to do a post-doctoral fellowship at Johns Hopkins University.

Thinakaran knows that a research career has the potential to save lives. "My perspective on research is that it's an extremely rewarding experience," he says. "You really feel like you're making a difference in people's lives. It may not be rewarding in the short term, but it will be a fulfilling endeavour."

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**Correction:** Jason Bystriansky was incorrectly identified as "John" in the photo caption that accompanied his alumni profile in the spring 2017 issue. The *CBS Zygote Plus* regrets the error.

### Zygote Plus

Published by the College  
of Biological Science

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