Created *at* Guelph

UNIVERSITY of GUELPH

RESEARCH INNOVATION

2016-2017

Letter from the Executive Director

The Research Innovation Office at the University of Guelph helps translate research into applications that make an impact on society. **Our inventions help create jobs, protect the environment, and improve life.**

The past year has been filled with exciting new research innovations and impressive results. Our office reported 177 new inventions and doubled the number of patents issued. This report contains some of the stories we are most proud of from the past year, including an innovation that resulted in a new manufacturing facility in Guelph, the granting of a Governor General's award for a Guelph innovation, and the launching of new products in various sectors that span automotive parts to animal health.

We look forward to the coming year, as we have recently increased our capacity and restructured our office to create the newly-formed Research Innovation Office. This new structure is comprised of four pillars: **technology transfer, knowledge mobilization, industry liaison, and new venture creation.** The Research Innovation Office will continue to be adaptive and draw on the strengths of our researchers to help find innovative solutions to society's problems and move inventions and ideas to market. We will build upon the successful Gryphon's LAAIR program for commercially viable early-stage research, and launch new programming for our researchers interested in moving inventions and ideas to market.

We look forward to building on the incredible momentum gathered over the last year as we continue to enhance our research innovation and knowledge mobilization agenda at the University of Guelph.

Sherri Cox, Executive Director

Research Innovation Office

Knowledge Mobilization	Helping move research knowledge toward active use.
Industry Liaison	Building partnerships with industry.
Technology Transfer	Licensing technology to industry to create new products.
New Venture Creation	Connecting and enabling entrepreneurs.

Research with *Impact!*

2016 - 2017 Metrics

177
reported inventions

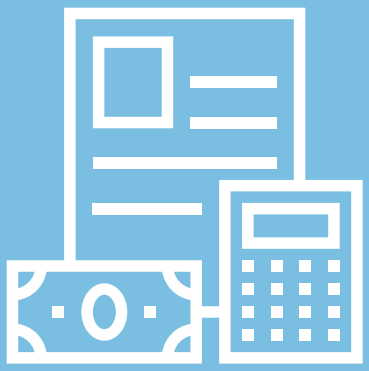
265
active agreements

15
patents issued

33
licenses/ options signed

$2.68M

licensing income



$146.1M

total sponsored research

Start-up Spotlight

Accelerating the growth of high potential start-ups using University of Guelph research.

Photo: Prof. Emma Allen-Vercoe, Kathleen Schroeter, Julie McDonald *(front row right to left)*. Jacquline Strauss, Michelle Daigneault, and Christian Ambrose *(back row right to left)*

Nubiyota

There are thousands of bacterial species in the human body, many of which help keep us healthy. Professor Emma Allen-Vercoe (*Molecular and Cellular Biology*) and her team have been developing treatments for people who become sick due to damaged bacterial populations. In pursuit of advancing the treatments, she founded the company NuBiyota. The company recently signed an agreement with Takeda USA to bring their products to market and help the people who need them.

Photo, from left: Guelph Mayor Cam Guthrie, Mirexus CEO Phil Whiting, Prof. John Dutcher and Mirexus VP Trevor Jones at Mirexus' groundbreaking

Mirexus

It has been a big year for Mirexus Biotechnologies. The company announced the closing of a $12 million financing round in June 2017, and followed that up by breaking ground on a new manufacturing and research facility in Guelph to support their growth. The company produces polysaccharide nanoparticles called PhytoSpherix™, discovered by UoG Professor and company co-founder John Dutcher (*Physics*).

Photo: Dana McCauley and Prof. Ibrahim Deiab in the CNC Lab

New Venture Creation

Programming for the entrepreneurial members of the University of Guelph community.

The Research Innovation Office is expanding our services beyond the traditional technology transfer and industry liaison activities we offered as the Catalyst Centre. This includes a greater focus on knowledge mobilization and more services that enable commercialization. In support of that expansion, Dana McCauley has joined the team as the Associate Director of New Venture Creation. She will lead the establishment of programming for University of Guelph researchers who are interested in exploring entrepreneurism or accelerating the growth of their existing start-ups. Exciting announcements related to these initiatives will be shared in the coming months!

Innovation Highlights

Supporting Guelph research to improve life.

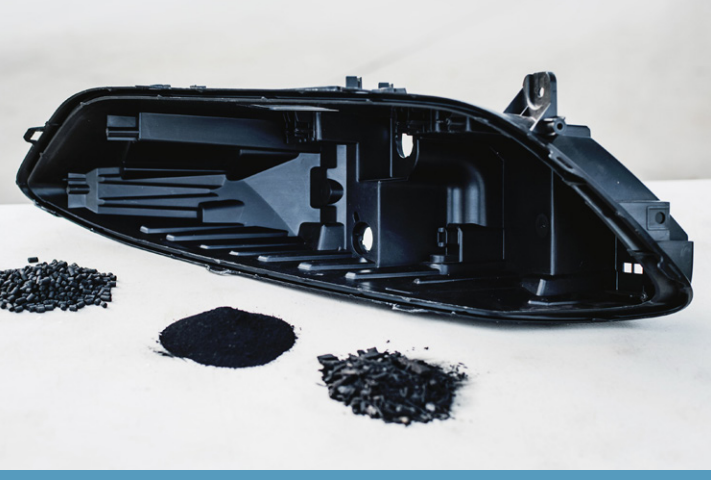


Photo: Automotive headlamp liner

Lightweighting Automotive Parts

Professors Amar Mohanty (*Plant Agriculture*), Manju Misra (*Engineering*) and their team have developed light-weight, biobased composite resins to replace a variety of plastics used in the automotive industry. The resins, produced by Ontario-based Competitive Green Technologies, are 23% lighter than the parts they replace and are being tested by a variety of car manufacturers for introduction into new vehicles as early as 2017/18.

Photo: Competitive Green Technologies team in Leamington

Proteobiotics for Health

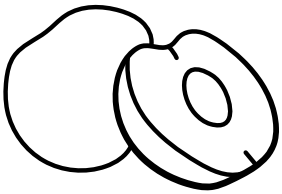
Start-up company MicroSintesis announced the introduction of new animal health products, called proteobiotics. These products are based on isolated molecules derived from probiotic bacteria that prevent virulence and improve health and growth. MicroSintesis' first sales are expected in 2017/18. The products were invented in the lab of Professor Mansel Griffiths (*Food Science*).

New Equine Vaccine

Professor Laurent Viel (*Clinical Studies*) and Dr. Susy Carman (*Animal Health Lab*) have isolated and characterized an equine rhinitis A virus responsible for causing respiratory disease in horses. This breakthrough allowed for the development of a vaccine in collaboration with Boehringer Ingelheim Vetmedica. The vaccine helps prevent respiratory disease in horses and improves their quality of life.

Germplasm

The development of new plant varieties has been a major source of innovation at Guelph for over 100 years!



New Plums and Peaches, 18 Years in the Making

After 18 years in development, the University of Guelph is releasing new plum and peach varieties to the market from the breeding program of Professor Jay Subramanian (*Plant Agriculture*). The yellow plums are larger and have better storage properties than those currently on the market; the peaches have an earlier season than current Ontario varieties, enabling farmers to extend their marketing season.

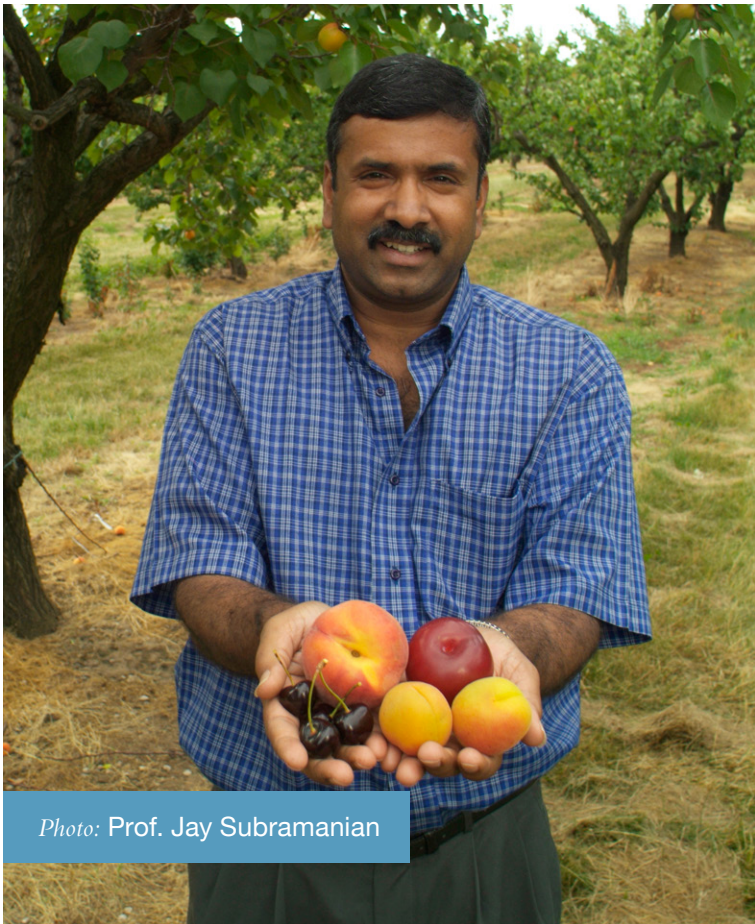
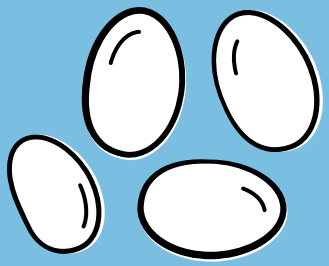
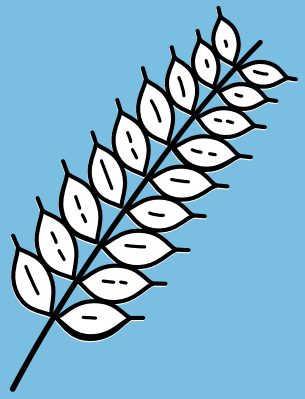


Photo: Prof. Jay Subramanian



Ridgetown Soybean Program Recognized

The soybean breeding program at Ridgetown campus was the recipient of the Seed of the Year award for 2017. Since 1988, the Ridgetown breeding program has released over 50 varieties of soybeans under the direction of the late Professor Gary Ablett and the current breeder, Professor Milad Eskandari (*Plant Agriculture*). Those varieties have been planted on millions of acres, helping grow Ontario's soybean production to more than 3.7 million tonnes over the past thirty years, a 200% increase.



OAC 21 – Resurrecting a Malting Classic

Barley variety OAC 21 was developed at Guelph by Professor Charles Zavitz and originally released in 1910. It was the dominant malting barley in Canada for 40 years. Now, seed for OAC 21 is being grown again for release in 2018 as a heritage variety for the craft brewing market.

Innovation of the Year

The annual awards from the Office of Research and the Catalyst Centre recognize faculty members for creative strategies or products that make a difference in people's lives.

Professor and Canada Research Chair John Dutcher (*Physics*) was selected for his work with nanoparticles, and Professor Bonnie Mallard (*Pathobiology*) was recognized for her immuno-genetic technology at a ceremony in the University Club on June 29th.

"These UoG discoveries are positively impacting the lives of people, the environment and communities," said Malcolm Campbell, Vice-President (*Research*).

"This research is creating sustainable, well-paying jobs while making a real difference in the health and well-being of Canadians. They are excellent examples of innovations coming directly from University of Guelph research that are fueling inclusive economic growth, with job creation at its heart."

Synthetic nanoparticles are often toxic and non-biodegradable, leading regulators to create substantial barriers before the technology can be adopted in the marketplace.

Dutcher's team discovered sweet corn nanoparticles of phytoglycogen, which are non-toxic, biodegradable and water-soluble. The PhytoSpherix technology is

now being marketed by the Guelph-based company Mirexus with 18 full-time employees.

“The leading applications are in personal care and this is now the main focus of sales in Mirexus,” said Dutcher.

“The applications in nutrition and biomedicine are perhaps even more promising, but this will take longer.”

Mirexus is building a manufacturing facility in Guelph to be running by 2018.

“Ultimately, the use of our particles in biomedical and pharmaceutical applications may be the most lucrative opportunity,” Dutcher said.

“It’s been rewarding seeing our discovery going from the lab to the marketplace. It was truly a team effort, and I’m very happy to share this award with my co-inventors.”

Photo: Prof. John Dutcher *(left)* and post-doctoral researcher Lauraine Wagter-Lesperance *(right)*, representing Prof. Bonnie Mallard’s lab, were honoured by Vice-President (*Research*) Malcolm Campbell at the innovation awards

Photo: Prof. Bonnie Mallard's HIR technology has also received a 2017 Governor General's Award for Innovation

Innovation of the Year

Mallard's High Immune Response (HIR) technology has already been recognized this year with a prestigious Governor General's Award for Innovation.

By improving breeding selection, the tool allows farmers to raise healthier animals requiring less treatment and antibiotic use. High immune responders have about half the disease incidence of their herd mates.

"The healthier the cow, the healthier the environment," said Mallard.

"I am very pleased this immuno-genetics approach has worked so well to improve animal health, and now has proven effective in the field."

The use of the technology by cattle genomics company Semex Alliance led to $18 million in sales in the first two years, and has helped the company grow by 60 per cent in the last three years.

"It is particularly fun to win both the Governor General's Award and the Innovation of the Year on Canada's 150th birthday. HIR provides benefits to the producer, the consumer and the animal, resulting in a healthier and sustainable food chain."

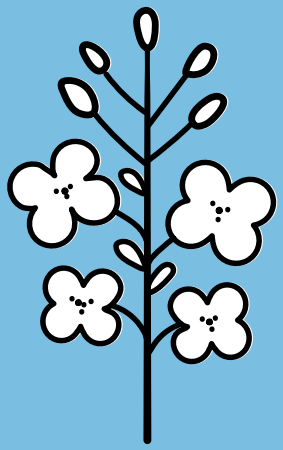
"The award is wonderful news and the whole HIR team is thrilled," **said Mallard.**

Industry Liaison

Helping companies access the University's research capacity and develop collaborative partnerships with faculty.

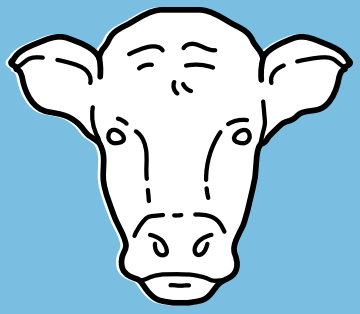
Our Industry Liaison team, Gregor Lawson and Vanja Djukic, make connections and provide strategic advice with regard to federal and provincial funding programs that support collaborative research. In doing so, the Industry Liaison Program (ILP) fosters stronger relationships, helping both the company and research team achieve their goals and increase the impact of their work.

Photo: Prof. Angela Cánovas



Improving Canola Yields

When Benson Hill Biosystems (BHB) approached Professor Peter Pauls (*Plant Agriculture*) to initiate a collaboration, the ILP was instrumental in connecting the team with complementary resources at the University. The project, which was expanded to include technology developed by Professors Michael Emes and Ian Tetlow (*Molecular and Cellular Biology*), was awarded $3.4-million through the Genome Canada GAPP Program. The three researchers will work together with BHB's Canadian subsidiary to translate traits from other plant species to canola to help increase crop yields and improve performance.

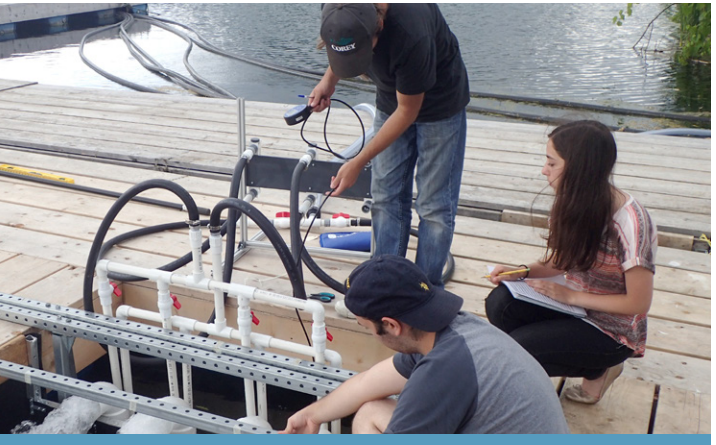


Advancing Selection Efficiency

Professor Angela Cánovas (*Animal Biosciences*) works closely with the Canadian beef industry on genomic-based approaches to improve production efficiency. The ILP helped connect Cánovas with the Ontario Centres of Excellence (OCE) and assisted in the development of an application to the OCE Alberta-Ontario Innovates Program. The project will bring together partners from both Ontario (Beef Improvement Organization) and Alberta (Delta Genomics) to develop tools that improve selection efficiency in beef cattle.

Gryphon's LAAIR

The Gryphon's LAAIR (Leading to the Accelerated Adoption of Innovative Research) program provides innovation grants to University of Guelph researchers attempting to commercialize new products and technology. In its fourth year of operation, Gryphon's LAAIR has successfully led to the formation of new companies and helped new products reach the Ontario agri-food market.



Photo, from left: Students Johnathan Szeliga, Rashal Abed and Mohammad Shallouf test the performance of airlift pump technology

Sustainable Aquaculture Production

Professor Wael Ahmed (*Engineering*) came to University of Guelph with experience developing energy efficient airlift pump technology for the oil and gas industry. After initial trials at Guelph showed the technology could be adapted for use in aquaculture, Ahmed and his partners used Gryphon's LAAIR funding to prove the benefits in field tests. The results of that study led to the creation of a new company called FloNergia to serve both the aquaculture and hydroponics market.

Photo: Prof. Allan King

Improving Litter Size in Swine

As a result of 25 years of genetic research, Professor Allan King (*Biomedical Science*) discovered a chromosome abnormality in male pigs that results in smaller litter sizes. After developing a test to screen boars for this defect, King used Gryphon's LAAIR funding to conduct a market assessment within the swine industry. That assessment revealed demand among hog farmers and led to King founding the company Karyotekk. His startup carries out testing for the genetic defect and enables farmers to remove affected boars from production.

Team

Photo: Research Innovation Office Team

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