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Molecular Genetics
UNIVERSITY OF TORONTO

MoGeNews

Issue 9 - May 2017

Editor's message

Welcome to our next issue of MoGeNews! We have much to report. The move to MaRS is complete, renovations to the remaining MoGen space in MSB have begun, we have successfully recruited one new faculty member to the MaRS group and the second search is concluding, our new graduate class is settling in to their new lab homes, and MoGen members have been highlighted in the news as well as in scientific publications.

We particularly want to advertise the **3rd Annual Career Development Symposium**, which will be held on **June 9, 2017** at the Chestnut Residence and Conference Centre. The event is held to promote interactions between trainees and our many extraordinary alumni from the Department of Molecular Genetics. Please see below and the website for event info and registration.

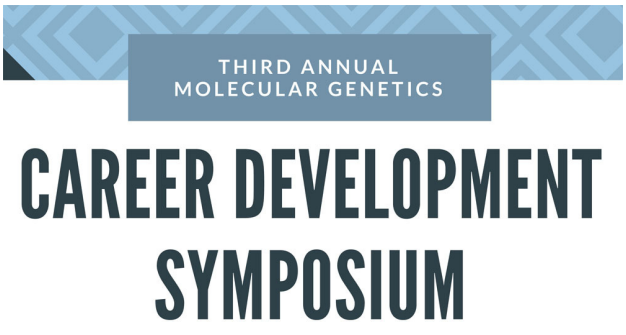
I would also like to add a special thanks to Monica Wu and Melissa Wong. Monica interviewed and contributed the Alumni Spotlights and both Monica and Melissa provided Community Events. This newsletter would not be possible without their help!

As always, we encourage all members of our community to keep us posted on discoveries, awards and achievements. Your input is crucial as we continue to build an engaged community.

Barbara Funnell

Table of Contents

3rd Annual Career Development Symposium

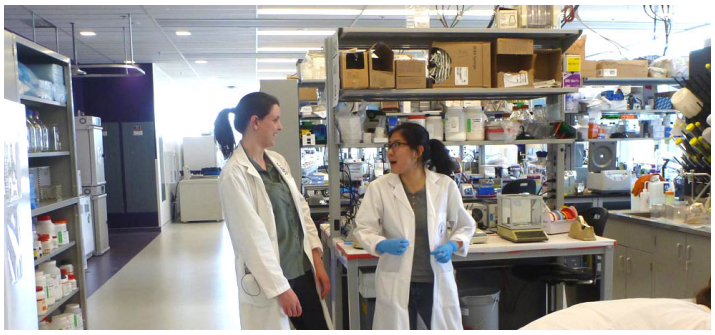


June 9, 2017, 1 to 7 pm: Save the date! The 3rd Annual Career Development Symposium will be held at the Chestnut Residence and Conference Centre. The afternoon will include round table career discussions and Q&A sessions with alumni, a panel on career trajectories, and a wine and cheese networking session. This year's panelists are:
Dr. Jacques Archambault, McGill University
Dr. John Calarco, University of Toronto
Dr. Elizabeth Higgins, GE Healthcare
Dr. Jennifer Semotok, GeneDx
Dr. Frédéric Sweeney, bioMérieux SA
Dr. Melanie Szweras, Bereskin & Parr LLP

The first two symposia in 2015 and 2016 were well attended and were extremely successful! We continue to foster and promote relationships between MoGen trainees, faculty and alumni in this day-long event. Please join us!

Click here for registration and event info.

Community Events



Move to MaRS!

The move of a large number of MoGen labs to the MaRS West Tower from the Medical Sciences Building is complete, and we are settling in to our new space. Labs are on the 15th and 16th floors, and we share the space with colleagues from the departments of Biochemistry, Lab Medicine & Pathobiology, and Medicine. The two floors are differentiated approximately by theme: MaRS 15 is Gene-Protein Regulation, and MaRS 16 is Molecular Microbiology & Infectious Disease. The lab space is open-concept to promote sharing of ideas and equipment, which is a big transition from the individual modules in the MSB. The desk areas are also open-concept and separate from the lab space, and each floor has common kitchen and interaction space. The space and facilities are brand-spanking new, and aside from a few technical growing pains, are up and running. And lots of windows!

MoGen Holiday Party 2016

The Department of Molecular Genetics had our annual holiday party on Friday, December 9th at the U of T Faculty Club. Over 200 tickets were sold to MoGen students, postdocs, faculty, staff members, and their guests for this packed event planned by our Graduate Students' Association. The GSA members who planned this event did an incredible job organizing and preparing for the holiday party, and our community greatly enjoyed this festive celebration. Attendees dressed up and enjoyed some delicious appetizers and drinks, the photo booth with its fun holiday-themed and science-related props, and showing off their moves on the dance floor.

In the spirit of the holidays, party-goers had the opportunity to bring a non-perishable food item to donate to Daily Bread Food Bank. In total, the GSA donated $200 from ticket sales and many cans of non-perishable food items thanks to the generosity of our community.

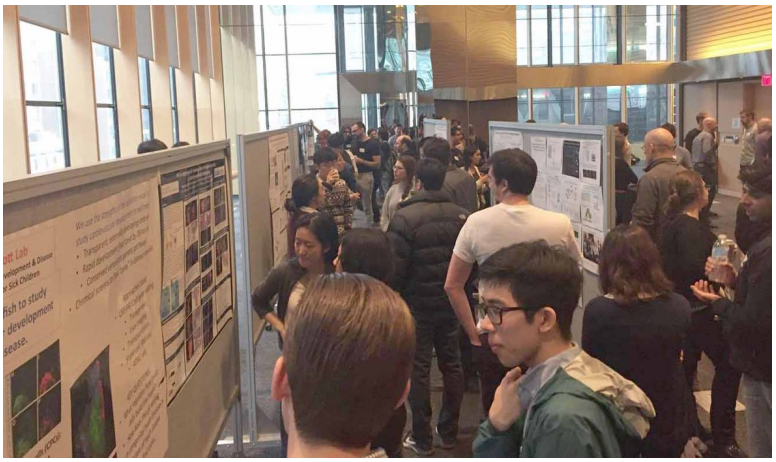
If you missed the event, or took some fun pictures with your friends, check out the pictures from the photo booth here.

Valentine's Day Candy Grams

This year MoGen had our first Valentine's Day Candygrams! The event was a huge success, with 180 candygrams ordered by MoGen faculty, staff, and students to friends and loved ones. The team of Cupids wrapped the bundles of candy and chocolate and hand-delivered them to recipients. The overwhelming turnout gave us the opportunity to donate the extra $90 in proceeds to the Heart and Stroke Foundation! We're thrilled with the popularity of the event and hope to surpass sales next year!

St. Patrick's Day Pub Night

March 16th was the annual St. Patrick's Day Pub night, which was celebrated in the traditional style with beer and greasy food. Freebies were kindly provided by the GSA. Held at O'Grady's, everyone was encouraged to dress in their best green attire. The winner of the "Most Spirited Dresser" was Benjamin Piette from the Tipale/Gingras Labs who accessorized his outfit with a green bowtie.



Recruitment Day

On March 24, MoGen opened its doors to a new generation of potential graduate students. As a clear demonstration of the popularity of the department, over 40 recruits travelled from all over Canada and the US to attend this event. Opening remarks and an introduction to the department were given by Dr. Leah Cowen, which were followed by scientific talks by Dr. Brian Ciruna, Dr. Leah Cowen and Dr. Mikko Taipale. A lively lunch was prepared and hosted by members of the GSA who then chaperoned recruits all across the four nodes for their individual meetings with various professors. A packed poster session was held at the atrium in PGCRL (including many munchies and bar). The recruits were then escorted to dinner at Scaddabush and the entire day ended with a pub night at Prenup. All in all, recruitment day was a complete success and we can definitely expect many of the students to return in September.

March for Science

Thousands of science fans took to the streets of Toronto on April 22 for the "March for Science Toronto" rally, one of over 600 such marches across the globe in support of scientific research. Many students, post-docs, professors and staff from MoGen were evident. As a nationwide event, the March for Science was not only a celebration of scientific achievements, but was a demonstration of all the important contributions that science has made to society. During these tough economic times and with politicians who are increasingly passing policies that ignore scientific evidence, it is up to us to take a public stand and champion the scientific cause. It was amazing to the see so many in our department participate and support such a worthy cause.

Alumni Spotlights

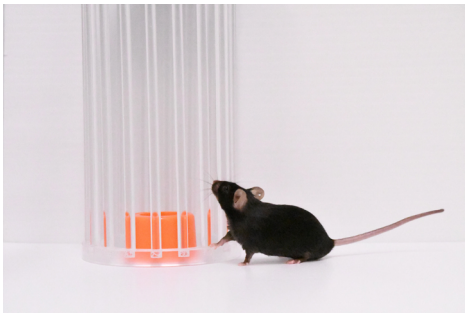
Dr. Faiyaz Notta reflects on his experience as a graduate student in John Dick's lab and how it inspired him to pursue a career in academia. After productive graduate and post-doc studies, he is now running his own lab as an Ontario Institute for Cancer Research (OICR) Fellow and Principal Investigator at the Princess Margaret Cancer Centre, studying the mechanism of pancreatic cancer development. Faiyaz shares advice on how to achieve an academic career and how to run a successful research program.
Click here to read the full spotlight.

Dr. Jacques Archambault is Professor of Microbiology & Immunology at McGill University. He shares his thoughts on his career from the time he was a graduate student with Jim Friesen, when the Department was then known as Medical Genetics, to his current interests in virology and viral pathogenesis.
Click here to read the full spotlight.

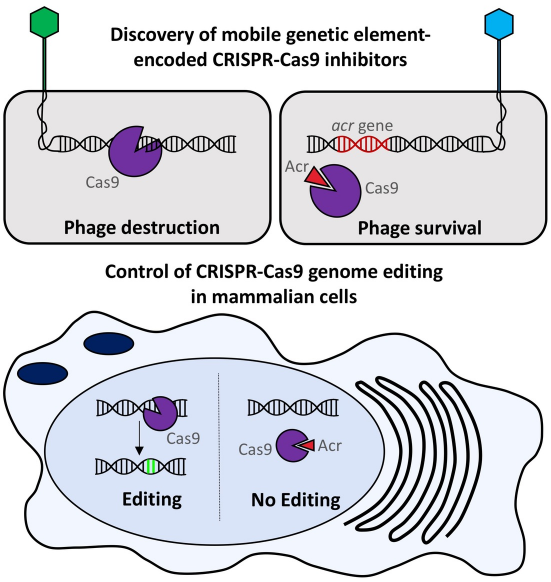
Research Highlights

Happy 150th Birthday, Canada!

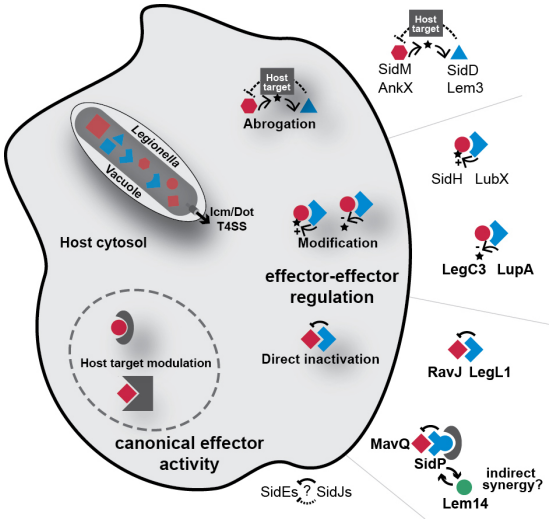
Dr. Stephen Scherer and his team have sequenced the genome of *Castor canadensis* – the Canadian beaver. The beaver in question is none other than Ward, a 10-year-old resident of the Toronto Zoo. The research, which is published in *G3: Genes|Genomes|Genetics*, is a partnership with U of T, Ontario Institute for Cancer Research (OICR), the Royal Ontario Museum (ROM) and the Toronto Zoo. Click here to read the full news story.



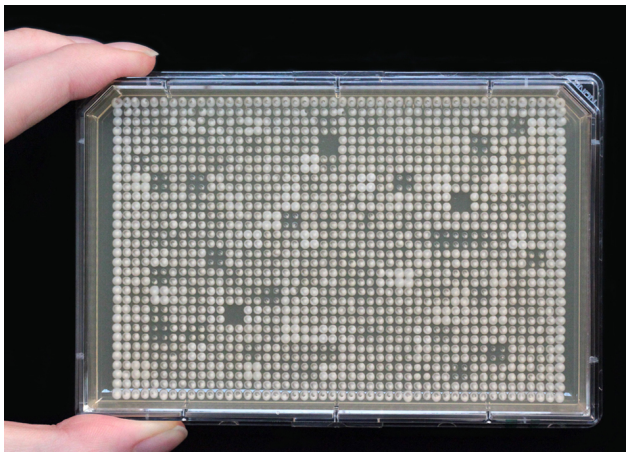
Autism spectrum disorder (ASD) is highly variable with respect to contributing genetic factors, and it has been a challenge to identify common molecular themes. A study led by **Dr. Ben Blencowe** and **Dr. Sabine Cordes**, and published in *Molecular Cell* has revealed that misregulation of the SR100 splicing protein may be a common mechanism underlying as many as one-third of those affected by the disorder. The research team developed a mouse deficient in SR100, which is active in neuronal cells. These mice exhibit several autism-like behaviours, which implicates SR100 as a key genetic regulator of the processes in neurons that are altered in ASD.
Click here to read more or read the story in the Globe & Mail.
(Molecular Cell 2016, 64:1023)



Turning off CRISPR: The CRISPR-Cas9 gene-editing system is a powerful genetic tool that works in all kingdoms of life. Its implementation is revolutionizing the ability to both fix and create directed genetic changes to a genome. A study, published in *Cell*, and led by **Drs. Alan Davidson and Karen Maxwell** (Biochemistry) has identified bacteriophage-encoded off-switches for CRISPR-Cas9, adding to this editing toolbox by providing genetic mechanisms to control and turn off the editing system in cells when it is no longer needed or where it might be deleterious. Click here to see more.
(Cell 2016, 167: doi 10.1016/j.cell.2016.11.017)

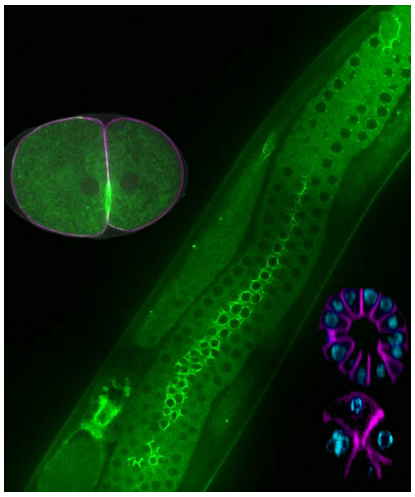


How do bacteria interact with cells during infection? Many bacterial pathogens modulate their hosts through complex arsenals of effector proteins that are injected into host cell during infection. *Legionella pneumophila*, the causative agent of the deadly pneumonia known as Legionnaires' disease, has over 300 effectors, which is the largest known arsenal amongst bacterial pathogens. To systematically map such interactions, **Dr. Alex Ensminger** and members of his laboratory have discovered a class of bacterial effectors with novel regulatory activities, using high-throughput biology and the yeast *Saccharomyces cerevisiae* to express each of the 110,000 possible pairwise combinations of *L. pneumophila* effectors and measure the resulting impact on the eukaryotic cell. This work illustrates the complexity of host-pathogen interactions and suggests that similar interactions may be critical in other intracellular pathogens.
(Molecular Systems Biology 2016, 12:893)



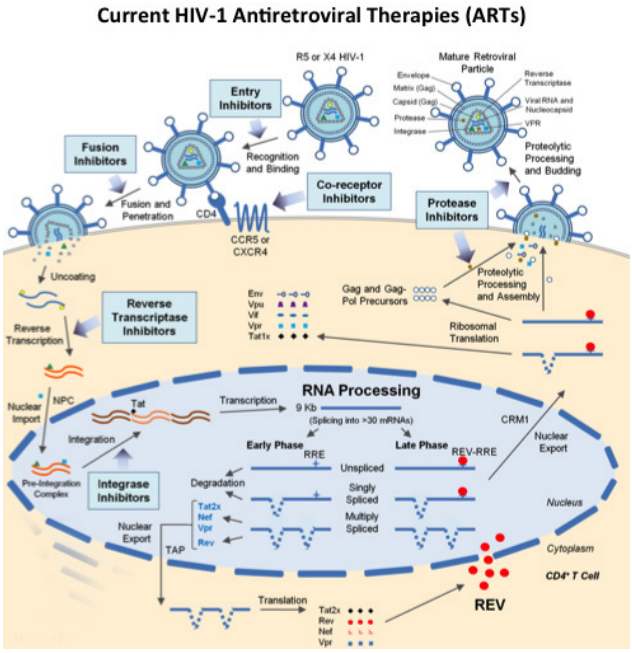
Genetic suppression, the ability of one mutation to alter or modify the phenotype of a second mutation elsewhere in the genome, occurs in all organisms. Teams led by **Drs. Brenda Andrews, Charles Boone and Frederick Roth**, in collaboration with Dr. Chad Myers of the University of Minnesota, have assembled a global network of genetic suppression interactions in a eukaryotic cell, using the yeast *Saccharomyces cerevisiae*. The study, published in *Science*, will help guide the identification of modifier genes that affect the behaviour of other genes, including those involved in the presence and severity of human disease. Click here to read more.
(Science 2016, 354: doi 10.1126/science.aag0839)

"C2H2 Zinc Finger" proteins represent the largest known class of human transcription factors, which act to control genetic regulatory networks. At least 700 members of this class have been identified, yet their targets and specificity have been difficult to identify. A study led by **Dr. Tim Hughes and Dr. Jack Greenblatt**, and published in *Genome Research*, has surveyed over 130 members of this group and uncovered surprising diversity in their DNA-protein and protein-protein interactions. Click here to read more.
(Genome Research 2016, 26, 1742)



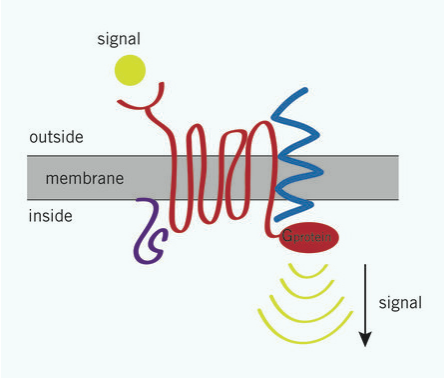
Cerebral cavernous malformations (CCM) are disorders that cause biological tubes in the brain (i.e., veins and capillaries) to become deformed and leak blood, leading to symptoms that can range from mild headaches to hemorrhagic stroke. In a study published in *Current Biology*, **Dr. Brent Derry** and colleagues used the model worm *C. elegans* to show that mutations in the CCM3 gene impair endocytic recycling of cell surface receptors and membrane to the cytokinetic furrow of dividing cells.The study provides new insights into the normal biological functions of CCM3, which should lead to the identification of therapeutic targets for treating CCM patients. See the story here.
(Current Biology 2017, 27:868)

Fighting parasitic disease: Parasitic worms are a global health problem, affecting human, plant and animal health, and many current "nematicide" drugs show high toxicity to humans. **Dr. Peter Roy and Dr. Andy Fraser** are using the harmless worm *C. elegans* to search for compounds that can lower the effective dose of nematicides when both drugs are used, and thus significantly lower toxicity. A new study published in *PLOS Neglected Tropical Diseases* identified a group of such compounds and characterized one called wact-86 for its ability to lower the effective dose of the nematicide aldicarb.
Click here to read the full story.



Fighting Viral Replication: Dr. Alan Cochrane, Dr. Martha Brown and colleagues have published, in 3 separate studies, the characterization of small molecule inhibitors of HIV-1 or adenovirus replication that function through the modulation of RNA processing. HIV and adenoviruses depend on proper RNA processing for viral gene expression and successful infection. The Cochrane lab has screened small molecule libraries for compounds that interfere with this essential process, which will lead to new antiviral therapies.
Click here to read more.

The world's largest whole genome sequencing study in autism reveals 18 new risk genes and describes massive cloud-based computational resource developed with Google. The study, led by **Dr. Stephen Scherer** and published in *Nature Neuroscience*, is part of the Autism Speaks MSSNG project – the world's largest autism genome sequencing program.
Click here to read more.
(Nature Neuroscience 2017, doi:10.1038/nn.4524)

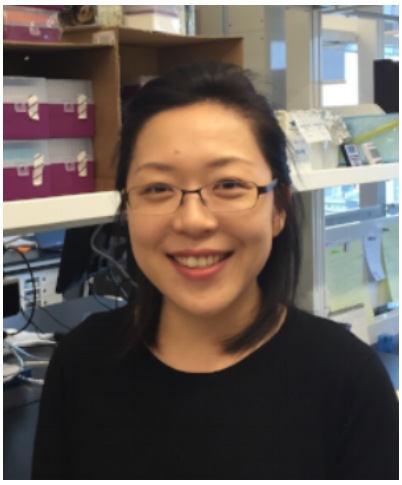


G-protein-coupled receptors (GPCRs) are the largest family of integral membrane receptors, regulate various cellular signaling pathways, and are often clinically important drug targets. A study led by **Dr. Igor Stagliar**, published in *Molecular Systems Biology*, has mapped the interactome of 48 human GPCRs. The largest survey of GPCRs to date, it revealed new associations among proteins involved in neurological disorders, such as motor neuron disease, schizophrenia, and neurodegenerative disorders, as potential targets for new drugs. Click here to read more.
(Molecular Systems Biology 2017, 13: doi 10.15252/msb.20167430)

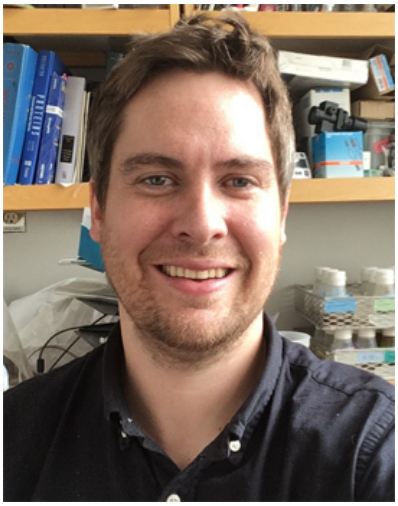
Faculty Highlights and Awards

Welcome to New Faculty

Dr. Jessica Hill was appointed as an Assistant Professor, Teaching Stream, in Molecular Genetics Online & Undergraduate Education, in November 2016. Her current research is focused on improving online education in medical genetics and microbiology. In particular, she is interested in evaluating the effectiveness of online educational tools, improving student engagement in online courses, and adapting modules for teaching medical genetics and microbiology in various settings.



Dr. Jeehye Park is a Scientist in the Genetics and Genome Biology Program at the Hospital for Sick Children, and was appointed to the Department as an Assistant Professor in February 2016. She completed her PhD at the Korea Advanced Institute of Science and Technology, and her postdoctoral training at Baylor College of Medicine in the U.S. Her research investigates the molecular mechanisms of neurodegenerative diseases with the aim of identifying targetable pathways for therapeutic interventions.



Dr. Thomas Hurd, new faculty recruit to Molecular Genetics

Dr. Thomas Hurd, our top candidate in the MoGen search "Genetic Models of Development & Disease", will join the Department as an Assistant Professor in January 2018, on the 15th floor of the MaRS West Tower. He studies mitochondrial biology in *Drosophila* and mammalian cells. His research program will focus on determining how mitochondrial DNA is inherited through the female germline, and how mitochondria influence stem cell fate and differentiation *in vivo*, with a long-term interest in applying this knowledge to develop better protocols for reprogramming and differentiating human stem cells *in vitro*. He completed his undergraduate work at the University of Toronto, his PhD at the University of Cambridge in Mike Murphy's laboratory at the MRC Mitochondrial Biology Unit, and his postdoctoral work with Ruth Lehmann at NYU School of Medicine.

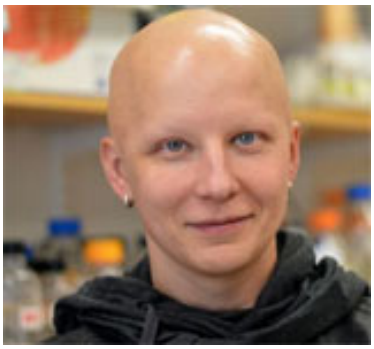
Faculty Awards

Dr. Lewis Kay has received two major prestigious honours. He been recognized with a *2017 Canada Gairdner International Award* "For the development of modern NMR spectroscopy for studies of biomolecular structure dynamics and function, including applications to molecular machines and rare protein conformations." The Canada Gairdner International Award is "awarded to outstanding biomedical scientists who have made original contributions to medicine resulting in an increased understanding of human biology and disease". Dr. Kay is one of five recipients in 2017 and he is the 1st Canadian to win this award since 2008.
See the Gairdner announcement and the Globe & Mail story.
Dr. Kay has also been named an *Officer of the Order of Canada*, the second highest level of this honour. He is recognized "for his pioneering research in biochemistry and medical imaging science which explores the structure and behaviour of proteins".
Read the U of T News story.

Dr. John Dick is the 2017 recipient of the inaugural *CIHR Gold Leaf Prize for Discovery*, "in recognition of his pioneering work as the first scientist to identify cancer stem cells. Dr. Dick's research holds the promise for improved treatments and quality of life for cancer patients." This prize recognizes excellence in health research and its translation into benefits for Canadians.
Read the story in UofT News and the CIHR News Release.

Dr. Monica Justice has been elected a *Fellow of the American Association for the Advancement of Science*. She was recognized for her contributions to genetics, and in particular for the development of the mouse as a model for identifying disease genes and elucidating therapies for human diseases. Click here to read more.

Dr. Anne-Claude Gingras has been appointed a *Tier 1 Canada Research Chair in Functional Proteomics*. Her research develops and uses sophisticated systems biology tools to map the protein-protein interaction networks inside cells and to better understand how these networks are altered as a consequence of disease.
See the story in UofT News.



Dr. Mikko Taipale has been appointed a *Tier 2 Canada Research Chair in Functional Proteomics and Protein Homeostasis*. His research examines how protein quality control networks are organized in cells and how they contribute to human disease, with particular focus on deciphering the Hsp70 chaperone and its co-chaperones.
See the story in UofT News.

Dr. Julie Claycomb is the 2016-2017 recipient of the *Early Career Excellence in Graduate Teaching and Mentorship Award*. The award recognizes Dr. Claycomb's outstanding contribution to the training of her graduate students through teaching, supervision and mentorship.

Dr. William Navarre was awarded the *Excellence in Linking Undergraduate Teaching to Research in Life Sciences Award*. The award recognizes his sustained excellence, mentorship and innovative methods that link undergraduate teaching to experiential research opportunities in Arts and Science offered by the Basic Sciences Departments in the Faculty of Medicine.

Dr. Julie Brill was awarded the *Excellence in Undergraduate Laboratory Teaching in Life Sciences Award*. The award recognizes Dr. Brill's sustained excellence in teaching, coordination and development of laboratory based instruction in life sciences laboratory courses.

Trainee Highlights and Awards

Dr. Ryan Gaudet is the winner of the Barbara Vivash Award in Molecular Genetics for his thesis, *TIFA-Mediated Innate Immune Recognition of the Bacterial Metabolite HBP and its Role in Host Defense*.
The Vivash award acknowledges the most outstanding Ph.D. thesis defended during the 2015/2016 academic year. Nominees for this award must have produced a major work of scholarship that has led to significant advance in understanding the molecular genetics mechanisms underlying an important biological process. Ryan completed his PhD under the supervision of Prof. Scott Gray-Owen. Ryan's work led to two first author research papers, in *Science* and in *Cell Reports*.
The Vivash Award includes a significant monetary award, a certificate, and an invitation to present his work in a full Departmental seminar. Ryan's seminar is scheduled for June 26, 2017. Further details will be updated on the MoGen website.

Samuel Lambert has received one of three 2017 Jennifer Dorrington Doctoral Research Awards for his PhD studies with Prof. Tim Hughes. Samuel is studying the DNA-binding specificity and evolution of transcription factors, which are responsible for controlling gene expression, in and across different species. Click here to read more.

Dr. Wei Zhang has received the *Mitacs Award for Outstanding Innovation* for his work on creating molecular antidotes against viruses that cause Middle East Respiratory Syndrome (MERS) and Crimean-Congo Hemorrhagic Fever (Congo Fever). Dr. Zhang studied with Dan Durocher for his Ph.D. in Molecular Genetics, and is currently a postdoc with Jason Moffat and Dev Sidhu at the Donnelly Centre. See the full story here.

Links to previous editions of MoGeNews

To access previous issues of MoGeNews, please click on the relevant link:

Issue 1
Issue 2
Issue 3
Issue 4
Issue 5
Issue 6
Issue 7
Issue 8

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