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MoGeNews

Issue 5 - August 2015

We hope that you are all enjoying a wonderful summer! It was great to see so many of you at our inaugural Molecular Genetics Career Development Alumni Symposium in June, which was such a success that we have already begun planning the event for next year!

As we make great strides with building our community, we would like to emphasize that we would love to hear from you. We encourage updates from current faculty and trainees on research discoveries and awards, and welcome communication from our alumni regarding career transitions, discoveries, awards, and thoughts on how best to cultivate an engaged community that serves your needs. Please direct communications to [me](#) or to our [Alumni Page](#), as desired.

We hope that you enjoy this summer issue of MoGeNews, which features highlights of community events, alumni trajectories, research discoveries, and faculty and student achievements.

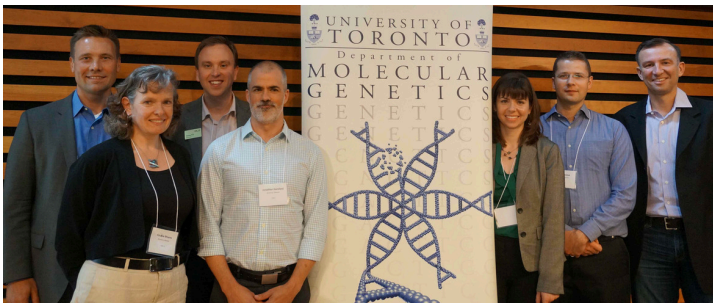
Sincerely,

Leah Cowen

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Community Events



Career Development Alumni Symposium.
Exploring Careers.
Building Community.
Celebrating
Excellence. These

were the goals set forth for MoGen's inaugural Career Development Alumni Symposium and not only were they met, but all expectations were exceeded. The event took place on June 4th at the beautiful Bram and Bluma Appel of the Toronto Reference Library. Co-organized by Dr. Leah Cowen and Dr. Julie Claycomb, the symposium aimed to connect current trainees with MoGen's extraordinary alumni to further career mentorship within our own community. The Symposium was made possible by generous support from our sponsors: Centre for the Commercialization of Antibodies and Biologics (CCAB, Title Sponsor); Northern Biologics and LifeTechnologies (Gold Sponsors); Burroughs Wellcome Fund, Donnelly Centre, SickKids Research Institute, and Ontario Institute for Cancer Research (Silver Sponsors); and Norgen Biotek Corp., Beckman Coulter, IDT, Qiagen, Fisher Scientific, Perkin Elmer, Amplyx Pharmaceuticals, Molecular Devices, and U of T Faculty of Medicine (Bronze Sponsors). If you were unable to attend the Symposium this year, do not worry! Plans are already under way for next year and it will be even bigger and better! Click [here](#) for additional details.



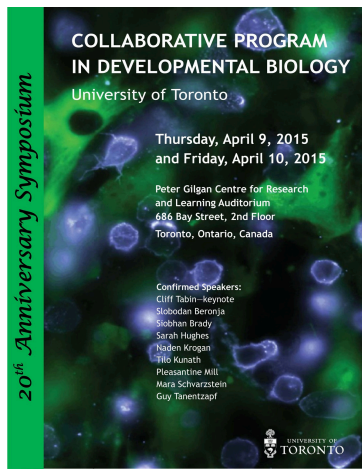
Science Rendezvous. The University of Toronto hosted its 8th annual Science Rendezvous on May 9, 2015. This free event was held outdoors on St. George Street and focused on bringing public awareness, especially to children, of the exciting advancements in science and technology. Over 30 Molecular Genetics volunteers, including faculty and students, gathered bright and early on Saturday morning to set up 7 different exhibits, including: banana

DNA extraction, How Unique Are You? (comparing genetic traits to population frequency), model organism showcase, code breakers (using the genetic code to decode secret messages), Marvelous Microbes, and more. Click [here](#) to learn more.



Graduate Information Day. On March 27, we welcomed close to 40 prospective graduate students, one of the highest attendances seen in recent years, to the annual MoGen Graduate Information Day. Students travelled from all corners of Canada and also from the US and overseas to hear about what MoGen has to offer. When asked why they were interested in MoGen, the overwhelming response from the recruits focused largely on the Department's outstanding and wide range of research topics, along with the unique flexibility of the rotation system. The day

was such a tremendous success that we held a second Recruitment Day on June 19th, and welcomed an additional 22 students to our Department. Click [here](#) for more details.



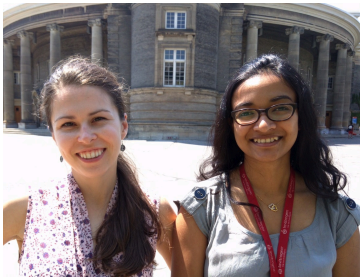
Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium. The Collaborative Program in Developmental Biology (CPDB) celebrated its 20th anniversary this year. Originally established in 1995, the program’s mandate was to facilitate cross-disciplinary collaborations between different departments at the University of Toronto and to promote and foster research in the field of developmental biology. Currently, the program spans six departments, including Molecular Genetics, and comprises of over 40

professors and nearly 60 graduate students. To celebrate this milestone, CPDB held a symposium on April 9-10, 2015 at the PGCRL Auditorium with invited speakers including outstanding past graduates of the program who are now successfully running their own labs in Canada, the US and Europe. True to its purpose of connecting different research disciplines, the talks spanned all areas of developmental biology, from stem cell therapies to chromosome segregation, cilia biology, retinal development and much more. Clear [here](#) for more details.



SickKids Program in Developmental and Stem Cell Biology (DSCB) Symposium - “Frontiers in Development, Cancer and Stem Cell Biology”. On April 8th 2015, the Program in Developmental and Stem Cell Biology (DSCB) at SickKids held its very first symposium entitled “Frontiers in Development, Cancer and

Stem Cell Biology”. Co-organized by Molecular Genetics professors Dr. C-c Hui and Dr. Janet Rossant, the symposium invited high profile developmental and stem cell biologists from all around the world to showcase the amazing research being conducted in the field. The symposium also served to celebrate Janet Rossant’s outstanding scientific achievements, as well as her leadership contributions as the Chief of Research at SickKids, including overseeing the completion of the Peter Gilgan Centre for Research and Learning. Due to the success of their first symposium, plans are already underway for a second one in Spring 2016.



Anna Sintsova and Epshita Islam.

University of Toronto Microbiology and Infectious Disease Research Days. More than 220 faculty and trainees participated in this year's annual 'University of Toronto Microbiology and Infectious Disease Research Days', which were held on June 15-16, 2015. This is the only event each year that brings together infectious disease-focused clinicians, clinical scientists and basic researchers from across campus and all University-affiliated teaching hospitals, with the

intent of highlighting research progress and sharing ideas. 75 abstracts were submitted by our trainees, from which 12 were selected for oral presentations during Monday's "Trainee Day". On Tuesday, a morning of seminars from our invited speakers was followed by lunch and a vibrant poster session. This year's event was hosted by Professors Scott Gray-Owen (Department of Molecular Genetics) and Rupert Kaul (Department of Medicine), with our Trainee Day being organized by Mogen graduate students Anna Sintsova and Epshita Islam. Congratulations to our all award winners, who can be found [here!!!](#)



Career Development Workshop. Our inaugural year of successful Monthly Career Development Workshops finished strong on April 29th with the last workshop entitled, "Everything About Postdocs." This workshop featured a panel of experts on all things related to postdoctoral fellowships, including: Dr. Weija Wang – former

postdoc in Dr. Peter Zandstra's bioengineering lab; Dr. Jillian Hatnean – Business Development Specialist at Mitacs; Dr. Mikko Taipale – new Molecular Genetics PI; Dr. Angus Sinclair – Senior Director at Northern Biologics; and Dr. Elizabeth Csaszar – Development Scientist at the Centre for Commercialization of Regenerative Medicine. After hearing about their 5 very different experiences as postdocs in diverse laboratory settings, Molecular Genetics undergraduate and graduate students engaged in a discussion about postdocs, followed by an open networking session where students could interact with panelists one-on-one. We are excited to announce that our workshop series will continue in September, so please do not hesitate to contact us if you would be interested in sharing your experiences.

Alumni Spotlights



Dr. Elizabeth Higgins, Founder and CEO of GlycoSolutions Corporation shares her journey from her doctoral work with Prof. James Dennis in the Department of Molecular Genetics to realizing her ambitions to become an entrepreneur.

Elizabeth highlights key memories from graduate school, and provides sage advice for trainees hoping to pursue careers in biotechnology or as entrepreneurs. Click here to [read](#) more.



Dr. Scott Dixon, Assistant Professor of Biology at Stanford University discusses his career trajectory from being drawn to functional genomics research in MoGen to launching his own lab focused on cell death programs in development and disease. Scott highlights his experiences

embarking on doctoral research as the first graduate student in Prof. Peter Roy's lab, and reflects on how to make the most of your training

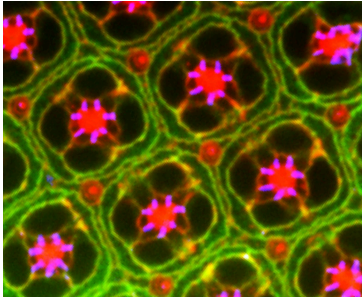
to position yourself for an academic career in research. Click [here](#) to read more.



Dr. Michael Szego, Clinical Ethicist, Centre for Clinical Ethics reflects on his journey from completing his PhD with Prof. Roderick McInnes to earning a Master of Health Science in Bioethics and launching his career that brings together clinical consultations, policy development, education, and research.

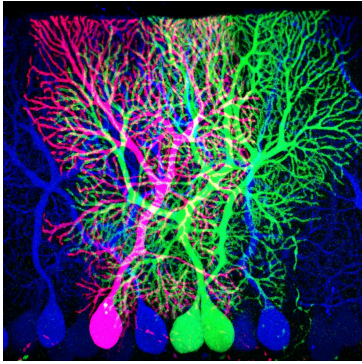
Michael highlights eureka moments in his career trajectory, the power of PhD training, and the importance of following your heart in career planning. Click [here](#) to read more.

Spotlight on MoGen Research Field: Genetic Models of Development and Disease



Drosophila pupal eye stained for actin (red) and armadillo (green). Image courtesy of Lauren Del Bel and Julie Brill.

MoGen researchers studying Genetic Models of Development and Disease aim to understand how the instructions required to produce a complex multicellular organism are encoded in the genome, how they are interpreted during embryonic development, and how errors in their implementation underlie diverse pathologies, including many types of cancer. How a single cell, the fertilized egg, develops into an individual that may comprise trillions of cells has fascinated observers since its discovery. Over the past 40 years, phenomenal advances with genetic analysis and molecular biology have revealed many of the mechanisms that lay out plans of the developing body, those that specify the identities of different cell types, and those that pattern tissues and organs throughout the body. One of the striking lessons to emerge from such studies is that a small number of well conserved regulatory pathways act repeatedly during development, in different contexts, and in organisms ranging from simple invertebrates to humans, to control decisions about cell fate, tissue growth, pattern formation, and morphogenesis. Consequently, discoveries about the workings of these pathways in simple, highly tractable organisms can readily be applied to aid the investigation of development and genetic disease in more complex ones, including humans.



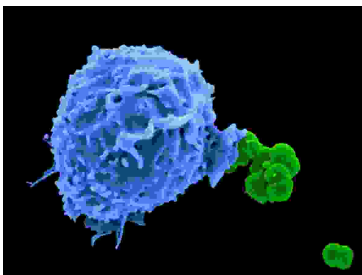
Brainbow Purkinje nerve cells. Image courtesy of Julie Lefebvre.

Researchers in MoGen take advantage of diverse model organisms, including worms, fruit flies, zebrafish, and mice, as well as cell and organ cultures to investigate questions spanning the fields of developmental biology, stem cell biology, neurobiology, gene regulation, and epigenetics. We harness powerful techniques including forward and reverse genetic analysis, phenotypic screening, gene cloning, transgenesis, embryological manipulation, light and electron microscopy, genome editing, and genome sequencing, as well as transcriptome and proteomic analysis to address some of the most

fundamental questions in biology. Our diverse labs have made seminal discoveries that shape our understanding of cell fate decisions in embryo, signaling between tissues, stem cells and their properties, nervous system patterning and function, organogenesis, morphogenesis, transcriptional and post-transcriptional regulation, and epigenetic inheritance at the level of RNA and chromatin. Our approach is embodied by a collaborative and interdisciplinary spirit, and benefits from extensive interactions with the other MoGen Research fields. Our work is at the forefront of science both in Canada and internationally.

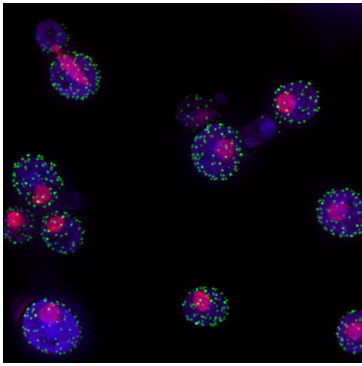
For a closer look at MoGen research in Genetic Models of Disease and Development, please read the full field spotlight [here](#).

Research Highlights



Neutrophil destroying Neisseria gonorrhoeae. By R. Gaudet and A. Sintsova.

Research on gonorrhea uncovers new immune system trigger. ([Science 2015 348: 1251-5](#)). MoGen team led by Dr. Scott Gray-Owen discovered that Gram-negative bacteria produce a specific sugar (heptose) that acts as a flare to alert the immune system of the harmful bacteria. This discovery could lead to new therapeutics and treatments based on modulating the immune system. To learn more, click [here](#).



Charting the first comprehensive protein map of a cell. (*Cell* 2015 161:1413-24)..

Utilizing robotics, high-throughput imaging, and machine learning for automated analysis, this MoGen team led by Drs. Brenda Andrews and Charlie Boone assessed the abundance and localization of over 4,000 yeast proteins tagged with a fluorescent reporter. This tour de force effort enabled the team to assess dynamic proteome changes in response to drug

treatments, and paves the way for similar analyses in human cells. Click [here](#) to learn more.



Study reveals why bad genes don't always lead to bad diseases. (*Cell* 2015 162:391-402).

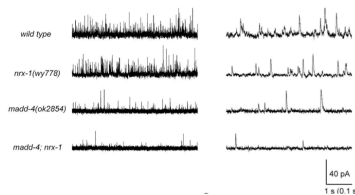
MoGen team led by Dr. Andrew Fraser compared the effects of loss of function of 1,400 genes in the genome of two isolates of the powerful model organism *C. elegans*, and found that the effects differ for 20% of genes between the two individuals. These differences are largely attributable to natural variation in gene expression, and have profound implications for personalized medicine. Click here to [read](#) more.



Discovery of how physical forces remodel cellular organization and limb development. (*Nature Cell Biology* 2015 17:569-79)..

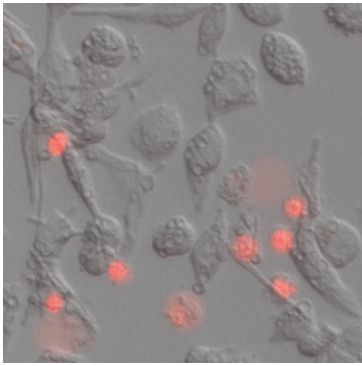
The team led by MoGen scientist and pediatric surgeon Dr. Sevan Hopyan used cutting-edge techniques to reveal that as cells divide and develop, they communicate with each other and the pressure resulting from movements influences how limbs are formed.

This work has profound implications for preventing birth defects.



Elucidating mechanisms that control the maturation of neural connections (*Neuron* 2015 86: 1420-32). MoGen team led by Dr. Mei Zhen combined electrophysiology, genetics, and biochemistry in *C. elegans* to uncover a key role for MADD4/Punctin and Neurexin in promoting

inhibitory synapse maturation. Click [here](#) to learn more.



Candida albicans cells escaping from macrophages. Courtesy of Teresa O'Meara.

Discovery of how a deadly fungus evades the immune system. (*Nature Communications* 2015 6:6741). MoGen team led by Dr. Leah Cowen developed a functional genomic approach to identify genes important for a leading human fungal pathogen to change shape and cause disease. They identified hundreds of novel regulators of morphogenesis, and found that this shape change was not required for the fungus to escape from immune cells. Rather exposure of sugar on the fungal cell surface activates an immune cell death program. This work suggests much-needed new therapeutic strategies for infectious disease. To

learn more, click [here](#).



Development of *C. elegans* as a model for anthelmintic drug discovery. (*Nature Communications* 2015 6:7485).. Team led by Dr.

Peter Roy has established the tractable model nematode *C. elegans* as a powerful system for discovering drugs to combat parasitic nematodes, which infect one quarter of the world's population, with profound effects on all humans through infection of crops and livestock.

Faculty Highlights and Awards



Dr. Janet Rossant receives the 2015 Canada Gairdner Wightman Award. This is one of the most prestigious biomedical research awards in Canada. Rossant is being recognized for her extensive scientific contributions to developmental biology, her international leadership in stem cell biology and policy-making, and for her pivotal role in advancing research programs for children's health. Click [here](#) to [read](#) more.

Dr. Janet Rossant is also appointed a Companion of the Order of Canada. His Excellency the Right Honourable David Johnson, Governor General of Canada, made the announcement on July 1st, 2015 in recognition of Rossant's achievements that have advanced the global understanding of embryo development and stem cell biology, and her national and international leadership in health science. Click [here](#) to read more.



Dr. Monica Justice is appointed a Canada Research Chair (Tier 1) in Mammalian Molecular Genetics. As head of the Genetics & Genome Biology program at SickKids, Justice's research aims to ameliorate disease states in humans by merging mouse modelling with clinical genetics—a method that can be applied to a variety of health issues. Click [here](#) to read more.



Dr. Julie Lefebvre CRC is appointed a Canada Research Chair (Tier 2) in Developmental Neural Circuitry. Lefebvre's research focuses on understanding how nerve cells in the brain are organized into circuits that enable functions such as sight, motor skills and language. Click [here](#) to read more.



Dr. Igor Stagljär named 2015 Inventor of the Year. Stagljär was recognized for his invention of Mammalian Membrane Two-Hybrid (MaMTH), which tracks a class of proteins called membrane proteins as they interact with other proteins to either maintain or contribute to health. These proteins are associated with more than 500 diseases. This technology provides a new tool to examine membrane proteins in their natural environment of the human cell. It is sensitive enough to detect minor changes upon the introduction of drugs and thus should prove

useful in the development of therapeutics, especially for cancer and neurological diseases.



Dr. Fritz Roth demystifies home-based genetic testing. This Toronto Star article highlights the intrigue associated with identifying your genetic variants to predict disease risk, and emphasizes the importance of skepticism in most risk estimates. Click [here](#) to read more.

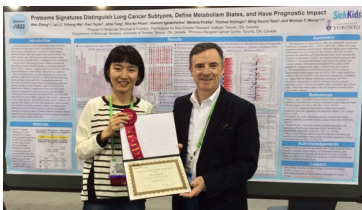


Dr. Dev Sidhu comments on the importance of public science in drug development. In this CBC article, Sidhu suggests that drug prices should be based on knowledge of the actual costs of the development and how much public science was involved, rather than being shrouded in corporate secrecy. Click [here](#) to read more.

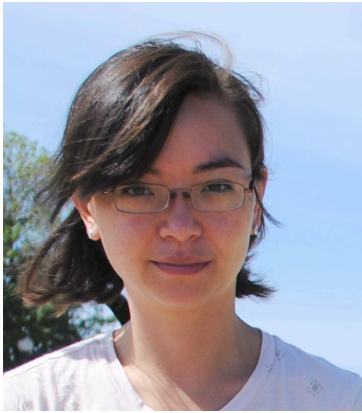


Dr. Alex Ensminger explains one of the hottest new technologies in genomics. This podcast explores how CRISPR brings a multi-purpose tool into the genetics toolbox. To access the podcast, click [here](#).

Trainee Highlights & Awards



MoGen graduate student Wen Zhang (Moran Lab) was awarded a “Women in Cancer Research Scholar Award” for her presentation at the American Association for Cancer Research Annual Meeting. Click [here](#) to [read](#) more.



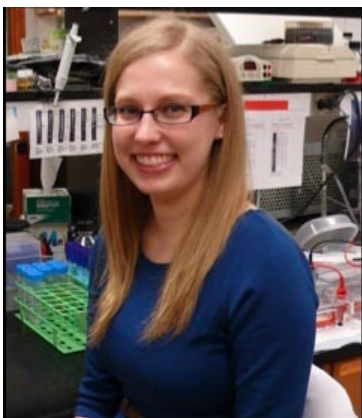
MoGen postdoc Dr. Teresa O'Meara (Cowen Lab) wins a young investigator awards for her presentations at the 2015 Fungal Genetics Conference at Asilomar and the FASEB meeting on Molecular Pathogenesis: Mechanisms of Infectious Disease. Her poster was entitled: Global Analysis of Fungal Morphology Exposes Mechanisms of Host Cell Escape. Click [here](#) to read more.



MoGen postdoc Dr. Michelle Leach (Cowen Lab) wins a young investigator award for her presentation at the 2015 Fungal Genetics Conference at Asilomar. Her presentation was entitled: The heat shock response governed by Hsp90 and Hsf1 is necessary for cell survival and virulence in the pathogenic fungus *Candida albicans*. Click [here](#) to read more.



MoGen graduate student Tanvi Shekhar-Guturja (Cowen Lab) wins an Outstanding Young Investigator Award for Elevator talk and Poster Presentation at the 6th FEBS Advanced Lecture Course on Human Fungal Pathogens in La Colle sure Loup, France. Her presentation was entitled: Combinatorial Cellular Perturbations to Abrogate Antifungal Drug Resistance.



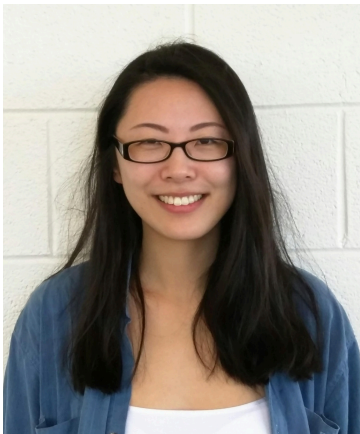
MoGen graduate student Elizabeth Polvi (Cowen Lab) wins the David W. Malloch Award for Best Graduate Student Presentation at the 31st Annual Great Lakes Mycology Meeting. Her presentation was entitled: Dissecting the role of divalent metal cations in *C. albicans* echinocandin resistance and morphogenesis.



MoGen Postdoctoral Fellow Carolyn Buckwalter (Gray-Owen Lab) wins a Trainee Seminar Award at the University of Toronto Microbiology and Infectious Disease Research Days. Her presentation was entitled: Insights into *Neisseria meningitidis* infection and immunity from the CEACAM-humanized mouse model.



MoGen graduate student Amanda Veri (Cowen Lab) wins a Trainee Seminar Award at the University of Toronto Microbiology and Infectious Disease Research Days. Her presentation was entitled: Global analysis of fungal morphology reveals mechanisms of host cell escape.



MoGen Graduate student Cynthia Guo (Gray-Owen Lab) wins a Trainee Poster Award at the University of Toronto Microbiology and Infectious Disease Research Days. Her poster was entitled: Contribution of Heptose-1,7-bisphosphate to gonococcal infection and disease.



MoGen graduate student Monica Wu (Claycomb Lab) wins an Outstanding Poster Presentation Award at the Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium.



MoGen graduate student Chris Wedeles (Claycomb Lab) wins an Outstanding Poster Presentation Award at the Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium.



MoGen graduate student Wendy Cao (Lipshitz Lab) wins an Outstanding Poster Presentation Award at the Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium.



MoGen graduate student Curtis Boswell (Ciruna Lab) wins an Outstanding Poster Presentation Award at the Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium.



MoGen graduate student Xuefei Yuan (Scott Lab) wins an Outstanding Poster Presentation Award at the Collaborative Program in Developmental Biology (CPDB) 20th Anniversary Symposium.

MoGen graduate student Evan Wallace (Derry Lab) also won an Outstanding Poster Presentation Award at the CPDB Symposium.

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