Subject: Molecular Genetics eNewsletter - MoGeNews - Issue 17
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From: Molecular Genetics
To: MoGen News

Molecular Genetics
UNIVERSITY OF TORONTO

MoGeNews

Issue 17

Editor's message

Hello MoGen students, staff, faculty, alumni and friends!

With another stint of reduced capacity in campus research labs behind us, the Department continues to adapt to an ever-changing situation. Our classes currently are delivered as a mix of in-person, online and hybrid sessions. We are excited to have three in-person events planned to gather as a community, such as our **Career Symposium** on June 6, a **Post-Exams Celebration** on June 2 and the **2022 Retreat** on September 23.

Below you will find a mixture of updates from our community on research, awards, as well on two retiring faculty members. We would like to express a special thank you to

the previous editor of this newsletter, **Barbara Funnell**, and wish her all the best for her retirement.

As always, this newsletter would not be possible without contributions from our community. Thank you to **Matthew Rok, Zoe Clarke, Barbara Funnell, Jovana Drinjakovic, Jim Oldfield, Peter Roy, Brian Ciruna and Rahul Kalpavalle** for contributing content to this issue.

Lastly, an invitation to our community: Please send updates about publications, awards, noteworthy grants and other news to be highlighted in the newsletter to mogen.news@utoronto.ca. Thank you!

Martina Steiner
Soha Usmani

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Community News and Events

We will hold our 7th annual Career Symposium in-person on Monday, June 6th at Hart House

Join us for an afternoon of networking, career development and learning in our 7th annual Career Development Symposium! Talk with alumni in roundtable discussions, get career advice from keynote speakers, and listen to our panellists talking about their diverse experiences. We're looking forward to mingling with current and former members of the Department with wine and cheese!

Our event is supported by OICR (platinum-level sponsor), the Donnelly Centre, LTRI and SickKids (silver-level sponsors) and many other contributors. Thank you!

Please mark on your calendars and register for the event.

We are planning a post-exams celebration on June 2

This will also function as the postponed holiday party and will take place in the Faculty Club. Stay tuned for more details!

The Department of Molecular Genetics launched a new website

The MoGen Department recently transitioned its website to a new layout, following the look and feel of other departments in the Temerty Faculty of Medicine. We offer new information for our postdocs and our collection of previous newsletters. Users can also now filter and view faculty based on research interests/areas and locations, news categories and public events such as Ph.D. defences and colloquium talks. We also have new **Field Spotlights** to give you insights into the research that happens at the Department!

Check out our homepage and explore more there.

Prof. Gray-Owen (right) with Minister Champagne (left); Credit: Johnny Guatto

Canada's Science and Innovation Minister visits the C-CL3 lab during his UofT tour

François-Philippe Champagne, Canada's minister of innovation, science and industry, recently visited the UofT campus to tour the groundbreaking facilities. This included being guided through the C-CL3 unit located in MSB by MoGen faculty member and unit director Dr. Scott Gray-Owen, which will be at the forefront of the EPIC mission (read below) and future pandemic preparedness research.

Read the full story on UofT News

The MoGen GSA EDI Committee launched their EDI in STEM and Beyond seminar series

The GSA Equity, Diversity and Inclusion (EDI) Committee is a small group of dedicated graduate students who organize initiatives related to EDI that aim to educate students and faculty as well as promote inclusion in the department. In collaboration with the Department of Molecular Genetics and the Genetic Counseling program, the committee has recently launched the "EDI in STEM and Beyond" seminar series. The seminar series aims to identify EDI-related issues in the field and develop the competence and professional skills required to lead an ethical career in STEM. We have invited leading experts who will cover specific topics including the role of science and scientists in society, EDI in research and innovations, Ethics and EDI in Precision Medicine, and more! Our goals are to facilitate students' understanding of the impacts that research and science have on society and to consider what the STEM community might require to be more equitable. Our next seminar will be on April 14 with Dr. Melanie Jeffrey to discuss Medical Research with Indigenous Populations.

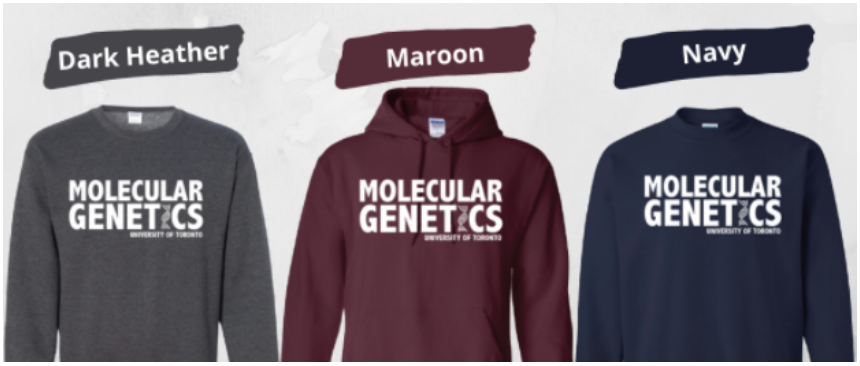
We are always looking for more help, so if you are a graduate student in MoGen who is interested in EDI, please reach out to get involved. We would also like to start some mental health and wellness initiatives, so if you are a MoGen student with a specific interest in mental health, please reach out by email!

The MoGen GSA Career Resources Team launched their first 2022

workshop this February
The workshop's content and activities followed the #1 New York Times bestseller book, "Designing Your Life". In this event, attendees undertook "Odyssee Planning" and learnt how to apply design thinking principles to moulding a meaningful and satisfying life.

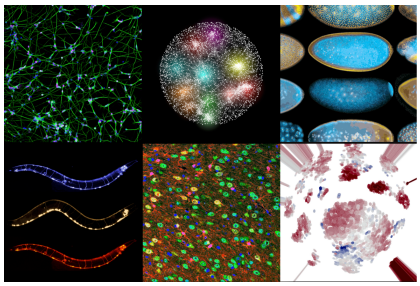
MoGen 2022 Retreat
Following a successful virtual Retreat in 2021, planning for the 2022 Retreat has been underway. With restrictions easing and the community spread of COVID-19 falling the department is tentatively planning to finally return the Retreat to an in-person event for 2022. Currently, it's planned for **September 23** at **Hart House and the Faculty Club**. Save the date and stayed tuned in the following months for updates!

MoGen Sweaters
Last year, MoGen got its very own sweaters! Look around for these flashy crewnecks and hoodies in maroon, grey, and blue, featuring a double helix hidden in the letters of the department. Considering the popularity of these sweaters, they will likely make a comeback in the next couple of years. Let us know if there is any other sort of merch you would like to see in the future by emailing the GSA.



The return of in-person activities
Pub nights and other popular in-person events are returning with the easing of COVID-19 restrictions. In the fall of 2021, we were able to organize two very popular pub nights for Orientation Day and Halloween at Prenup Pub. We are optimistic for the return of these sorts of events in the upcoming year!

Donnelly Centre art exhibit
The Donnelly Centre launched an art exhibit in December featuring research images from its PIs.



Created by Ronit Wilk

Dr. Brenda Andrews commissioned the exhibit to mark the 15th anniversary of the centre, with Krause and Lipshitz lab alumni Ronit Wilk creating the piece.
Read the full story here on Donnelly Centre News

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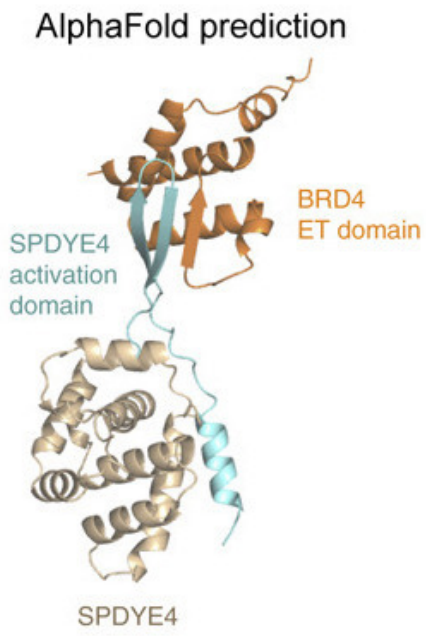
Research Highlights

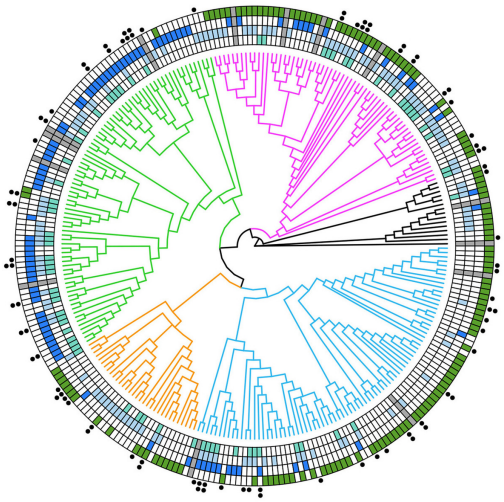
Discovering a treasure trove of gene activators
Dr. Mikko Taipale's lab, alongside the



Alerasool et. al. (2022)

Gingras lab, generated the first and largest catalogue of transcriptional activator proteins by conducting a proteome-scale screen. The study increased the number of known human transcriptional activators to 250, characterized the interactions of these activators with known cofactors and discovered new activation domains. The team also took advantage of Google Deep Mind's AlphaFold2 bioinformatics software to predict and pinpoint the interaction interfaces between two activation domains. They also demonstrate how these newly-discovered activators are involved in cancer.

Link to the Donnelly Centre news piece
Molecular Cell 2022, doi=10.1016/j.molcel.2021.12.008



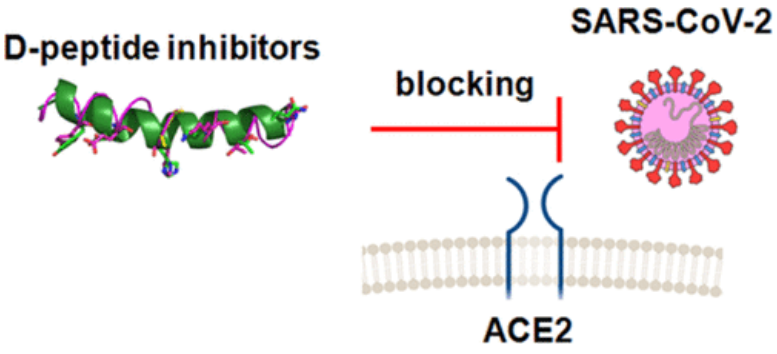
Murareanu et. al. (2021)

Creation of a new database cataloguing 1400+ microsporidia parasite species, plus figuring out how a host intestinal protein promotes microsporidia infection
Dr. Aaron Reinke's group generated a microsporidia database containing 1440 species and their characteristics, including but not limited to the host species and tissues each infects. This catalogue portrays the full diversity and systematically characterizes the microsporidia phylum as a whole. Moreover, the publication outlines the history and geography of the species' discovery and found the more hosts a species infects, the more tissues they invade and that closely related species typically infect the same tissue types and reside in the same environments. It also constructs an rRNA-based phylogeny tree, implying microsporidia primarily evolve to infect related hosts but are able to dramatically change their host of choice.

mBio 2021, doi=10.1128/mBio.01490-21

Several microsporidian species infect the model organism *C. elegans* in its natural habitat, especially by *Nematocida parisii* which infects its intestinal cells. The Reinke lab, alongside the **Fraser group** and others, recently discovered and characterized a new gene designated *aaim-1*, which codes for a nematode-specific host factor secreted by the intestine and has been demonstrated to promote microsporidia infection. Mutant worms are resistant to infection, while animals with restored AAIM-1 expression recover *N. parissii* infectivity. Interestingly, overexpressing AAIM-1 diminishes *Pseudomonas aeruginosa* colonization and aiim-1 mutants are more susceptible to its colonization and infection.

eLife 2022, doi=10.7554/eLife.72458



Valiente et. al. (2021)

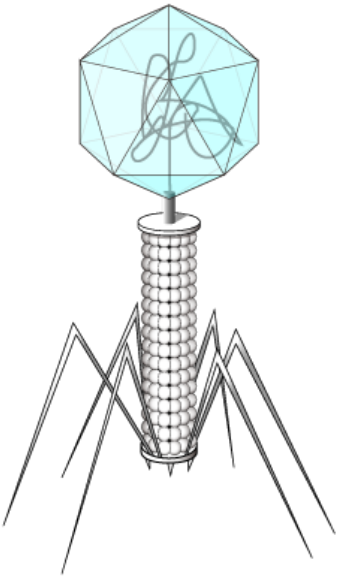
Using D-peptides to neutralize SARS CoV-2 virus

Dr. Philip Kim's group designed D-peptide inhibitors to block SARS CoV-2 from binding the ACE2 receptor, preventing viral infection of host cells. All naturally existing/wild-type proteins are L-peptides, meaning they have a left-handed configuration. However, in this study, the Kim team synthesized mirror-image peptides with inverse geometry to their wild-type counterparts called D-peptides. This was done with a computational tool that generates mirror image or D versions of peptides/proteins in the Protein Data Bank. The main advantages of them are the lack of recognition by the immune system, meaning it won't be broken down or degraded by enzymes, low cost (far cheaper than antibodies) and ease of design with the software.

Journal of Medicinal Chemistry 2021, doi=10.1021/acs.jmedchem.1c00655

Identifying tail assembly genes of phages

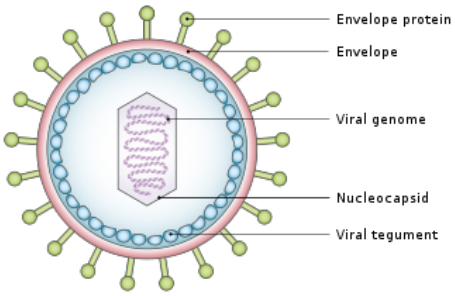
Roughly 80% of known bacteriophages have long tails, which are needed for infection and replication and require tape assembly chaperone (TAC) proteins to form. Understanding how these tails assemble and function is relevant given the roles of phages in



Database Center for Life Science (DBCLS)

biotechnology and therapeutic development. Previously, researchers have not detected TAC-encoding genes in the *E. coli*-infecting T4 phage despite it being conserved and essential for phage function. Using bioinformatics analyses, **Dr. Alan Davidson**'s lab identified TAC coding genes in over 70 T4-like phage genomes and assigned functions for these genes. They also found that the translational frameshifting mechanism that produces long tails is conserved in T4-like phages.

Virology 2022, doi=10.1016/j.virol.2021.11.003



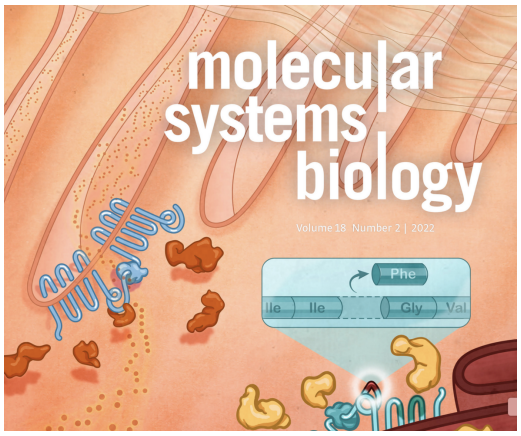
How Epstein-Barr viral proteins manipulate host cell functions

The Epstein-Barr virus (EBV) infects most of the human population, chronically infects its host for life, and is associated with numerous cancer types. EBV modifies many host cell pathways with its proteins during its infection cycle. One of these modulators is the BGLF2 protein, which induces increased SUMOylation of cell proteins and arrests the cell cycle. In collaboration with **the Greenblatt lab**, **Dr. Lori Frappier**'s team was the first to demonstrate how the EBV lytic protein BGLF2 interacts with the RISC cellular complex, implicating it as a regulator/interferer of many cellular miRNA functions.

PLoS Pathogens 2022, doi=10.1371/journal.ppat.1010235

Discovering 400+ proteins associated with cystic fibrosis

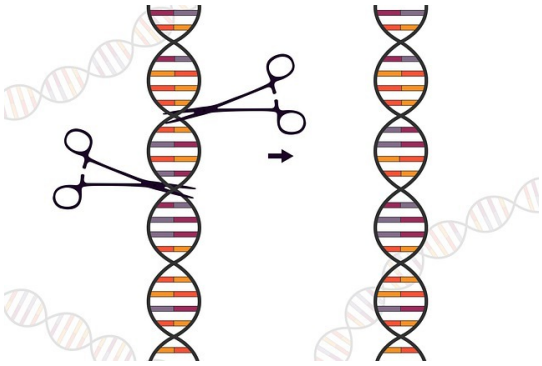
The hereditary disorder cystic fibrosis originates from faulty CFTR protein function and gene mutations, which results in mucus buildup in the lungs and other organs. **Dr. Igor Stagljar**'s team mapped out the CFTR interactome with the



John McGraw

Mammalian Membrane Two-Hybrid System, uncovering 447 candidate proteins with possible roles in normal CFTR function or cystic fibrosis. The team developed a high-throughput version of their own platform Mammalian Membrane Two-Hybrid (MM2H) System to screen and identify membrane protein-protein interactions associated with CFTR, scanning thousands of proteins as opposed to only 200 previously. One standout discovery was the Fibrinogen-like 2 disease protein, whose downregulation results in increased CFTR expression, making it a promising drug target.

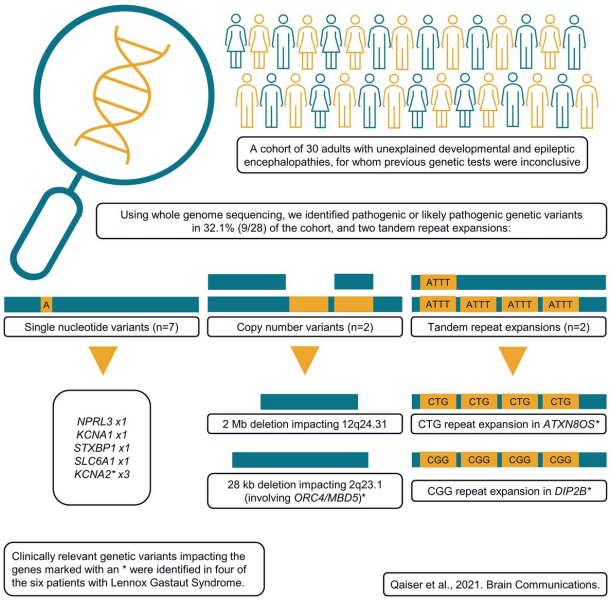
Read the Donnelly Centre news piece here
Molecular Systems Biology 2022, doi=10.15252/msb.202110629



Using CRISPR prime editing to classify pathogenic gene variants
A team co-led by **Dr. Ronald Cohn**, and also involving the **Pelletier lab**, designed a new CRISPR genome-editing methodology that can classify, analyze and interpret gene variants called saturation prime editing. Previously, researchers could only measure genetic variation in haploid cells but with this newly-developed methodology, it's possible to study any cell type. The team demonstrated its utility with the *NPC1* gene, whose mutations cause Niemann-Pick disease type C. With this gene, the team used CRISPR prime editing to generate approximately 1000 variants (10% of total known variations), test its ability to metabolize cholesterol and measure its disease contribution. They also applied this technique to the *BRCA2* gene, showcasing its promise for other genes as well.

Link to the SickKids news piece here
Nature Biotechnology 2022, doi=10.1038/s41587-021-01201-1

Using whole-genome

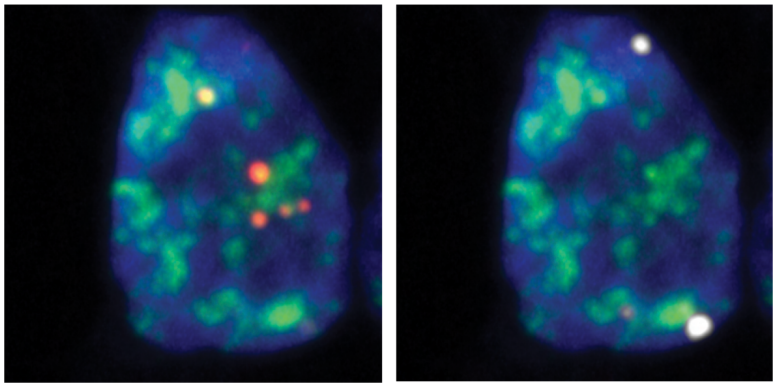


Qaiser et. al. (2021)

sequencing to shed light on unexplained epilepsies

Multiple epilepsy disorders have a significant genetic contribution or basis, such as Lennox-Gastaut (LG) syndrome, a severe type of childhood epilepsy. **Dr. Ryan Yuen**'s lab utilized whole-genome sequencing to pinpoint and identify rare genetic variants in an adult cohort with unexplained epilepsies. This includes rare pathogenic tandem repeat expansions, single nucleotide variants and copy number variants. The publication also provides the first report of coding and non-coding tandem repeat expansions in LG syndrome patients. The study as a whole demonstrates how WGS and examining rare genetic variants in the coding and non-coding genomic regions can gain insight into epilepsies and other conditions with unknown causes.

Brain Communications 2021, doi=10.1093/braincomms/fcab207



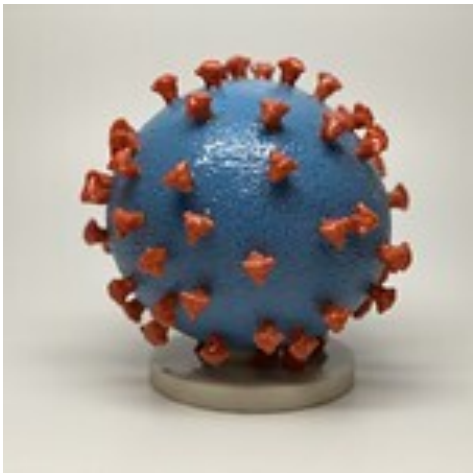
Barutcu et. al. (2022)

RNA map of the mammal cell nucleus

The cell nucleus contains structures called nuclear bodies or domains which are known to contain RNA transcripts but have unknown RNA composition. Members of **Dr. Benjamin Blencowe**'s lab, in collaboration with the **Gingras and Maass research groups** and others, created the first large-scale RNA transcript map of the mammalian cell nucleus. They did this via APEX-Seq, which uses the APEX enzyme to fuse with marker proteins and label nearby RNAs to be isolated. The researchers uncovered hundreds to thousands of novel RNAs in the nuclear bodies. They also found that numerous transcripts associated with speckles (a type of nuclear body)

retained introns (non-coding regions) found in genes involved in regulating the cell cycle, transcription and translation.

Link to the Donnelly Centre news piece here.
Molecular Cell 2022, doi=10.1016/j.molcel.2021.12.010



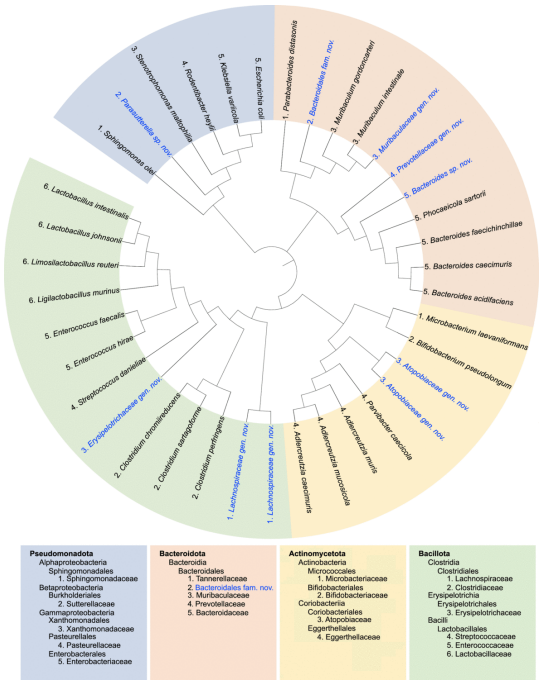
The potential for a nasal SARS CoV-2 vaccine

The lab of **Dr. Jun Liu**, in collaboration with the **Rini and Gray-Owen labs** among others, collaborated to produce a novel intranasal COVID-19 vaccine called HD-Ad_RBD based on an adenoviral vector. This vaccine secretes a soluble form of the viral S-protein's receptor-binding domain, mediating binding between the ACE2 host receptor and the virus. The researchers found that the vaccine induces immunity in transgenic mice with humanized ACE2 receptors and completely protects their upper and lower respiratory tracts against SARS-CoV-2 infection and prevents lung inflammation. The team detected high levels of neutralizing antibodies and antigen-specific IgG and IgA in vaccinated animals. These results are comparable to current intramuscular vaccines in the market.

Cell and Bioscience 2021, doi=s13578-021-00723-0

Cataloguing the lab mouse microbiota

Mouse models are critical for mammalian microbiome and microbiota research. Despite this, there is uncertainty regarding the full extent of similarities and differences between human and mouse-derived microbiota, impacting reproducibility in other experiments. **Dr. William Navarre**'s lab assembled the Collection of Inflammation-Associated Mouse Intestinal Bacteria (CIAMIB) to catalogue the full scope of the mouse gut



Wong et. al. (2022)

microbiota. The team also managed to discover novel bacterial species and characterize optimal/ideal growth conditions for different isolates. They were also behind the first metabolic analysis of the *Eggerthellaceae* family, and revealed its members as a new group of nitrate-reducing gut microbiota members.

mBio 2022, doi=10.1128/mbio.02949-21

Subramanian et. al. (2021)

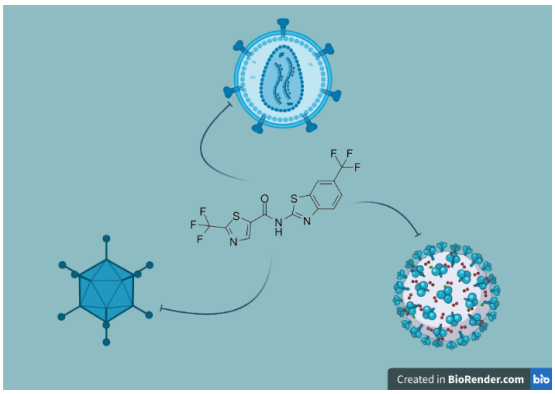
The conserved functions of poly-A tails and its role in cancer

Using genetic screens of the model organism *C. elegans*, **Dr. Brent Derry**'s team discovered the *cfim-1* gene as a novel, evolutionarily conserved regulator of the Ras signalling pathway. Specifically, cfim-1 codes for a protein factor that regulates alternative polyadenylation, or recruits poly-A tails to make transcripts with longer 3'UTR ends, with cfim-1 loss resulting in shorter 3-UTRs of Ras pathway transcripts. The team also tested the human homologue CFIm25 in human cancer cells and found its depletion increases cell migration and invasion, and RAS signalling in cells with oncogenic Ras. CFIm25 also regulates 3'UTR length in Ras signalling regulatory transcripts. Overall, CFIM-1 is an alternative polyadenylation factor that lowers/moderates Ras signalling through controlling 3'UTR length.

Science Advances 2021, doi=10.1126/sciadv.abh0562

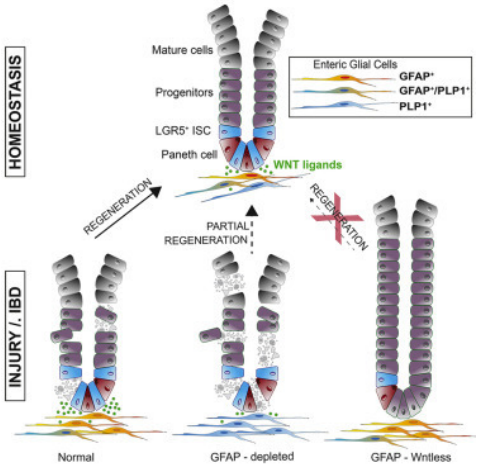
Molecule exhibits pan-antiviral activity by altering host cell environment

The majority of antivirals tend to target the viral structure such as its enzymes



and entry patterns. Lately, **Dr. Alan Cochrane**'s lab, in collaboration with the **Brown and Gray-Owen research groups**, looked into an alternative antiviral strategy via screening molecules/compounds that can target multiple viral species. In a recent publication, the group discovered the pan-antiviral activity of the GPS491 compound against HIV-I, human adenovirus-C5 and three coronavirus species, including SARS-CoV-2. Further experiments found that the antiviral activity of the compound is due to it modifying the activity of the host cell SR protein family.

Link to the MoGen Department's news piece.
Viruses 2022, doi=10.3390/v14010060



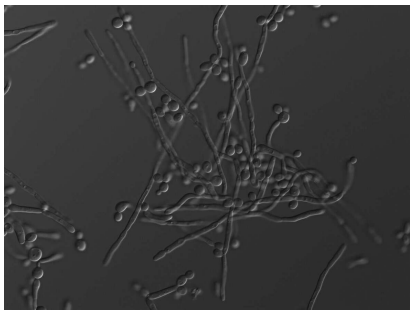
Baghdadi et. al. (2021)

Discovering the function of gut brain cells in IBD

Inflammatory bowel disease (IBD) is among the most common chronic and autoimmune disorders in the Western world. The intestines or gut undergoes chronic inflammation due to the high regeneration rates, which requires stem cells. Alterations in environmental signalling required by the gut stem cells prevent or handicap this regeneration. **Dr. Tae-Hee Kim**'s lab, in collaboration with the **Wrana group**, defines for the first time the role of intestinal glial cells (a type of CNS cell) in regulating neighbouring stem cells. They found that the glial cells regulate gut stem cell renewal and numbers and activate WNT signalling, which is involved with stem cell renewal and differentiation.

Link to the MoGen Department's news piece
Cell Stem Cell 2021, doi=10.1016/j.stem.2021.10.004

Using machine learning to pinpoint antifungal gene targets and discovering an



MacAlpine et. al. (2021)

antifungal human microbiota molecule
Drug-resistant fungal strains and species are a looming public health threat, especially with the restricted options for antifungals. Recently, **Dr. Leah Cowen**'s lab, with contributions from **the Gingras and Boone groups**, constructed a machine learning model that predicts if genes in *Candida albicans* are essential or not. The group discovered three previously unidentified genes and their functions, identified over 100 fungal-specific essential genes and found the *GLN4* gene to be a potential drug target. They also generated mutant fungal strains, expanded coverage of the *C. albicans* genome and specified which genes had no human homologs.

View the MoGen Department's news piece
Nature Communications 2021, doi=10.1038/s41467-021-26850-3

An additional publication from the Cowen lab discovered an antifungal molecule called 1-ABC from *Lactobacillus* bacterial species, prominent members of the human microbiota—the first-ever observation. *C. albicans* also belongs to the human microbiota, causing disease in immunocompromised and -suppressed patients. They observed its ability to block *C. albicans* filamentation and biofilm formation via inhibition of the Yak1 enzyme. They also discovered the fungal genes responsible for conferring resistance against 1-ABC and discovered a derivative of the said molecule called 1-ECBC that is just as effective in blocking fungal growth.

View the MoGen Department's news piece
Nature Communications 2021, doi=10.1038/s41467-021-26390-w

Other MoGen publications

- The functions of Argonaute protein isoforms in *C. elegans* fertility (**Claycomb lab**)
- Destruction of the Smaug protein requires the F-box protein Bard in early *Drosophila* embryogenesis (**Lipshitz lab**)
- New associating proteins and functions found for histone-depositing ATRX protein (**Campos lab w/ Gingras and Pearson labs**)
- Characterizing the role of the RIF1 protein in DNA repair (**Durocher lab**)
- The conserved roles of GATA4/5/6 transcription factors in heart development (**Scott lab w/ Wilson lab**)
- Development of the SmMIP-tools computational method for detecting single-nucleotide variants and short insertions and deletions from sequencing data (**Abelson lab w/Dick lab**)

- Advantages of trapped ion mobility spectrometry in MS-based proteomics (**Röst lab**)
- Activating adult mammal retinal stem cells through protein antagonism (**van der Kooy lab**)
- Shared transcriptional states between two different neural stem cell populations throughout development (**Kaplan-Miller lab w/ Bader lab**)
- Using machine learning to discover 100+ long non-coding RNA cancer biomarkers (**Schramek and Reimand labs**)

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Faculty Highlights and Awards

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Honours and Awards

Dr. Leah Cowen is now UofT's Vice-President, Research and Innovation, and Strategic Initiatives. This follows up from her previous role as the university's inaugural associate vice-president of research. Dr. Cowen is tasked with spearheading the university's research mission, encouraging collaboration and partnerships between researchers and promoting EDI.
Read the UofT News article for more information.

Dr. Scott Gray-Owen co-launched and leads the

Emerging and Pandemic Infections Consortium (EPIC). The goal of the research consortium is to prevent future pandemics, epidemics and emerging infections from triggering the same level of damage the current COVID-19 pandemic has. The group takes advantage of the Toronto Infectious Diseases Laboratories, where Toronto's C-CL3 unit. It also offers training programs such as postdoc fellowships and workshops and supports interdisciplinary research collaborations.

View the official website for more insight on EPIC's mission.

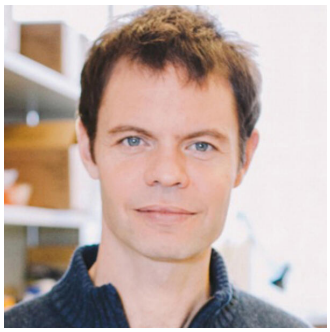
Dr. Igor Stagljar and drug discovery company Cyclica collaborate on the startup Pertruba Therapeutics for precision cancer treatments

Building on early collaborations, the Stagljar lab and the AI drug design company Cyclica launched a biotech startup specializing in targeted precision cancer therapies. Previously, the two groups developed two EGF receptor inhibitors for treating drug-resistant non-small cell lung cancer, the most prevalent lung cancer type. They plan on launching four programs that target small GTPases, which are enzymes typically mutated in several cancer types. The partnership will utilize two live cell-based assays first developed by the Stagljar lab called MaMTH and SIMPL to screen for compounds that perturb oncogenic protein-protein interactions in cancer cells.

Read Jovana Drinjakovic's article for more details.

The Temerty Faculty of Medicine interviewed Dr. Aled Edwards about preparing for future pandemics. This was based on his recent review paper in the Science journal about the development of COVID-19 treatments and vaccines, the takeaways and lessons learned from the pandemic and how to be ready for the inevitable next one.

Read Jim Oldfield's article here.



Dr. Andrew Fraser co-founded a UofT-based health startup Naloomar, which recently graduated from the 2021 UTEST cohort.
The company specializes in and utilizes novel sensor technology for detecting, analyzing and measuring small molecules such as drugs and metabolites. This assay uses sensors that release a unique DNA sequence called a barcode when they find their ligand, resulting in users detecting molecules by their released barcodes.
View the Twitter announcement here and the company website here.

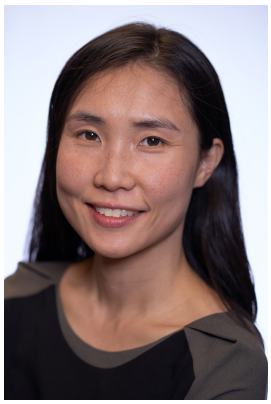
Drs. Julie Brill and Andrew Wilde collaborate on a Perspectives for Science article discussing the medical relevance of cytokinesis. In it, they discuss how cytokinesis defects are implicated in vision/eye disorders such as cataracts, glaucoma and the recessive disease oculoskeletodental syndrome.
Link to the Science article here.

Canada Research Chairs
Three Molecular Genetics faculty renewed or received Canada Research Chairs:

Dr. Benjamin Blencowe - *Tier 1 Canada Research Chair in RNA Biology and Genomics*. The Blencowe lab focuses on the mechanisms behind the regulation of gene expression and how said mechanisms are disrupted in human diseases and disorders. There's an emphasis on the regulation of alternative splicing and how it integrates with other gene expression layers to control fundamental biological processes.

Dr. Mikko Taipale - *Tier 2 Canada Research Chair in*

Functional Proteomics and Proteostasis (renewal). The Taipale lab works on technology development in functional proteomics and genomics, protein/protein interactions, host/pathogen interactions, induced proximity proteomics, transcription, rare diseases and other topics.



Dr. Ji-Young Youn - *Tier 2 Canada Research Chair in Membrane-less Organelle Proteomics*. The Youn lab studies the role of dysregulated biomolecular condensates in diseases such as ALS and the functions and roles of stress granules.

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Dr. Julie Lefebvre was one of the winners of Fighting Blindness Canada's 2021 Research Grant Competition, receiving $200,000. The project revolves around using optogenetics to observe how retinal cells transmit visual information and discover how retinal cell connections/circuits change after photoreceptor cells die. This will have important implications for developing therapies that can restore vision in patients with retinal degenerative conditions.
Get the full details on the FB Canada website.

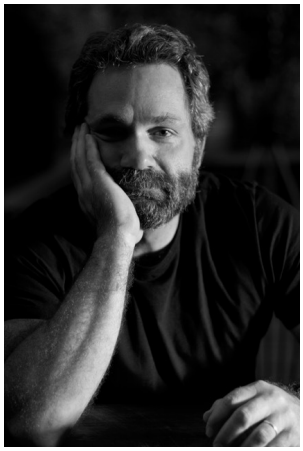
Dr. Hartland Jackson was one of the four recipients of the 2022 Terry Fox New Investigator Award, worth $450,000 over a three-year span. His funded project will

focus on shedding light on how the Hippo pathway regulates the immune response to cancer and mapping the tumour microenvironment, observing how modifying this pathway affects the recruitment or rejection of immune cells. The team will also work alongside Dr. Jeffrey Wrana.
Click here for more details on the research project and view the story/release here.

Dr. John Dick is the first recipient of the American Association for Cancer Research Award for Outstanding Achievement in Blood Cancer Research. He won this award for discovering leukemic stem cells, developing the first blood stem cell xenograft assay and learning how stem cells contribute to normal and leukemic blood stem cell formation.

Read the full AACR announcement here.

Drs. Brenda Andrews, Charles Boone and Gary Bader won federal funding from the Canadian Institute of Health Research (CIHR). The Andrews lab specializes in how genome variation impacts cell function and structure using the model organism Baker's yeast. They plan to develop new methodologies that can view and analyze millions of individual yeast cells. The Boone lab currently focuses on constructing the first human cell reference map which will unveil genetic interactions. Previously, they had created the first global interaction map for an eukaryotic cell with yeast. The Bader lab plans to research liver cancer on the molecular and cellular levels, specifically how cancer caused by Hepatitis B infection impacts liver cell function. They recently released a woodchuck/groundhog reference genome assembly on the NCBI BioProject website as a potential liver cancer model. Specifically, the woodchuck genome models hepatitis virus-induced hepatocellular carcinoma.
Read the full piece on Donnelly Centre News.



Dr. Peter Roy received over $270,000 of funding from the Government of Canada via the Canada Foundation for Innovation for his project "Chemical Genetic Exploitation of the Nematode *C. elegans* to Develop New Drugs, Nematicides, and Small Molecule Tools."
View the official CFI announcement for more details.

Drs. Ji-Young Youn and Jeehye Park won Discovery Grants from the ALS Canada Research Program, each winning $125,000. The Park lab will study how hypermetabolism impacts ALS disease processes, while the Youn lab will focus on whether undiscovered protein interactions modify FUS dysfunction caused by ALS.
Check out the official ALS Canada release here.

Dr. Yun Li was awarded a $100,000 Brain Canada grant, as part of the 2020 Future Leaders in Canadian Brain Research.
Get more details from the Brain Canada announcement.

Retired/Emeritus

Dr. Barbara Funnell, Professor Emerita
Please view the full piece by Dr. Peter Roy on the website.
Born, raised and educated (McGill) in lovely Montreal, Barb completed her Ph.D. in Ross Inman's lab at the University of Wisconsin-Madison where she studied bacteriophage DNA replication and transcription. She

continued her studies on DNA replication as a post-doc with Nobel Laureate Arthur Kornberg at Stanford. She joined our department in 1990 and was known as one of the three amigos of the MSB core, together with Brenda Andrews and Andrew Spence. Barb's scientific journey from the characterization of single proteins to a full in vitro reconstitution of the system represents a level of understanding and achievement that all of us aspire to but so few of us realize.

Her former student Anthony Vecchiarelli recounts how she inspired his love of science, 'My (undergraduate) fourth-year project with Dr. Barbara Funnell in the department was, ultimately, what sealed the deal for me. She was incredibly patient in teaching me how to work at the bench and was instrumental in building the foundation of scientific skills that I have now.' Barb's kindness and passion for plasmid biology made her very popular with undergraduate students. Remarkably, almost half of her graduate students and post-docs landed university faculty positions.

Barb served on multiple University and Faculty-level committees, she served as undergraduate coordinator for our department for over a decade and served on our executive committee as Vice or Associate Chair for another decade to ensure continuity through three different Chairpersonships (Lipshitz, Cowen and Hughes). Beyond our campus, Barb was President of the International Society for Plasmid Biology, has been on the editorial board of multiple journals, including Plasmid and the Journal of Bacteriology, and served on grant panels too numerous to mention. Barb - we thank you for all that you have given us and congratulate you on such an admirable career!

Dr. Janet Rossant, University Professor Emeritus
by Brian Ciruna

After 37 years with the Department of Molecular Genetics and an illustrious career as a scientific researcher, mentor, administrator and advocate, Dr. Janet Rossant is retiring from the lab. Following her training at the Universities of Oxford and Cambridge, Dr. Rossant established her independent research program in Canada – first at Brock University (1977-85) and then at the University of Toronto with labs at the Samuel Lunenfeld Research

Institute (1985—2005) and The Hospital for Sick Children (2005-2022). Here, she has supervised and mentored over 85 graduate students and postdoctoral fellows, instilling in them her passion for developmental and stem cell biology and her quest to understand the earliest events of mammalian embryonic development. Towards this goal, Dr. Rossant has made seminal research contributions, including technical innovations in mouse genome editing that have revolutionized genetic analysis and live-imaging of the mammalian embryo, as well as the establishment and characterization of embryonic epiblast, extraembryonic endoderm and trophoblast stem cell lineages, which have empowered researchers to interrogate early mammalian development in vitro.

Dr. Rossant is also known for her exceptional scientific leadership, serving on the board of Directors for UHN, Jackson Laboratory, the Canadian Stem Cell Network, Compute Canada, ISSCR and CIHR; as Chief of Research at The Hospital for Sick Children; and as President and Scientific Director of OIRM, OSCI, and the Gairdner Foundation. In recognition of her outstanding achievements, Dr. Rossant has been the recipient of many distinguished awards, including Companion of the Order of Canada; the Canada Gairdner Wightman Award; the Ross G. Harrison Medal, International Society for Developmental Biology lifetime achievement award; the Michael Smith Prize; the March of Dimes Prize in Developmental Biology; and the L'Oreal-UNESCO Women in Science Award (to name only a few!). Thank you, Janet, for your incredible scientific stewardship and inspiration. Although you may be ready to move from the bench, your legacy shall remain firmly seated.

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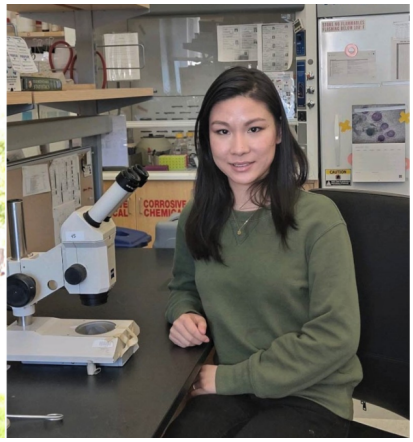
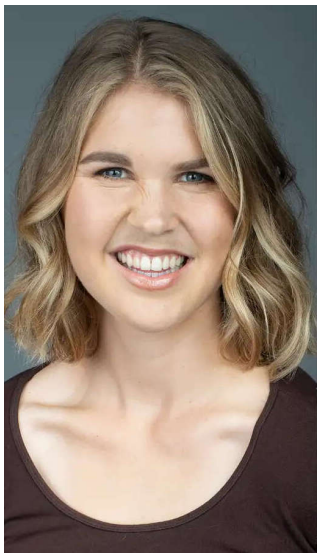
Trainee Highlights and Awards



Li lab grad student Afrin Bhattacharya wins the 2021-2022 David Stephen Cant Scholarship in Stem Cell Research. This annually granted scholarship is gifted to standout graduate students specializing in the area of stem cell research. In addition, **Lipshitz lab alumnus Wendy Cao wins the 2020-2021**

Barbara Vivash Award in Molecular Genetics for her thesis *"Precise Temporal Regulation of Ribonucleoprotein Complexes during the Drosophila Maternal-to-Zygotic Transition"*. Candidate theses for this award are characterized as significant breakthroughs in grasping the mechanisms of a key biological process on a molecular/genetic level.

Get more details from the MoGen Department's news piece here.



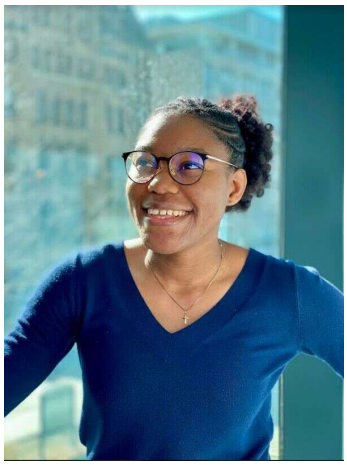
Ph.D. candidate Zoe Clarke from the Bader lab wins a 2022 Jennifer Dorrington Graduate Award, awarded to three graduate students at the Donnelly Centre annually. Clarke's work specializes in how woodchuck/groundhog cells infected with the hepatitis B virus become cancerous and their interaction with non-cancerous liver cells during progression.

Read the Donnelly Centre news piece here.

Member of the Roy lab and third-year undergrad Savina Cammalari published in JoVE where she outlines a culturing protocol that screens small molecules/compounds for anti-helminthic (parasitic worm) agents.

Read the MoGen Department featurette here.

MHSc in Medical Genomics candidate Yayra Gbotsyo was featured in UofT's Black History Month series in February. She plans to use her Master's to help individuals with undiagnosed genetic conditions in marginalized groups such as the black community and is currently working in a genome-wide association study that will discover COVID-19 susceptibility markers under Dr. Upton Allen in SickKids.



Read more in MoGen News and GLSE.

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Upcoming Award Application Deadlines

1. 2023-2024 Schmidt Science Fellows - Application deadline April 1, 2022
2. 2022-23 TFOM GSEF Merit Scholarships for International Students – Application

deadline April 4, 2022
3. Scholars-at-Risk Award – May 6, 2022

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Staff Highlights

Former Facilities Operation Officer in MaRS **Tim Burrow** (Ph.D., MBA) started a new position in the Rotman School of Management last November. Tim was crucial in setting up the move to MaRS during 2016-2017. We wish him all the best!

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Please visit the following links for COVID-19 resources and updates:
University of Toronto: UTogether
Temerty Faculty of Medicine: Return to campus

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Links to previous editions of MoGeNews

To access previous issues of MoGeNews, please click on the following links:

Issue 16

Issue 15

Issue 14

See Issue 14 for links to all earlier newsletters (Issues 1 to 13)

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