Daniella F. Lato

Research Fellow, PhD, HBSc

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EDUCATION

Biology Department, McMaster University, Hamilton, ON, Canada

Doctor of Philosophy in Bioinformatics Sep 2015 - Mar 2021

Supervisor: Professor G. Brian Golding

Thesis Title: Spatial Patterns of Molecular Traits in Bacterial Genomes

Honours Bachelor of Science in Mathematics and Biology Sep 2011 - Apr 2015

Supervisor: Professor G. Brian Golding

Honours Thesis Title: Substitution Rates in Relation to Position on the Replicons of *Sinorhizobium*

RESEARCH/WORK EXPERIENCE

Research Fellow Mar 2021 - Present

The Hospital for Sick Children, Toronto, ON, Canada

- Creating a bioinformatic pipeline to analyze Hi-C sequencing data, specifically focusing on determining significant inter-chromosomal interactions.
- Exploring genome organizations across healthy human cell types, focusing on trans- (inter-) chromosomal interactions.
- Aiming to explore the following questions:
  - Are there common areas where chromosomes meet or do not meet?
  - Is there tissue specific variation?
  - How does this relate to gene expression and other genomic features?
  - Do these contacts (or lack of) change with infection, stimulation, cell differentiation?
- Collaborate with labs across the globe, providing bioinformatics guidance and analysis.
- Manage undergraduate and graduate students research projects by providing vision, critical thinking, and direction regarding experimental design, research, and task distribution resulting in a successful projects.
- Concisely communicated scientific research to field specific, public audiences, and funding agencies.

PhD in Bioinformatics, Molecular Genomics, and Evolution Sep 2015 - Mar 2021

McMaster University, Hamilton, ON, Canada

- Exploring molecular traits such as gene expression and substitution rate, as they change with genomic position in bacteria while accounting for rearrangements and genomic content reorganization.
- Development and innovative application of advanced `R` and `Python` algorithms, analysis pipelines and other computational techniques to research phenomenon in molecular evolution and genomics.
- Familiarization with bioinformatics tools and experimental design related to data visualization, statistics, large-scale genomic data analysis, genetics, phylogenetics, molecular evolution, gene expression, and genome assembly.
- Create detailed documentation on operating procedures for computational pipelines.
- Considerable training in implementing Bayesian methods in high performance computing and programming (`Unix/Linux`), data visualization, statistical analysis, big data storage, and software tool development (`Bio-Conductor` libraries) and version control (`Git`).
- Independently designed and implemented experimental tools for bio-statistical testing and analytical processes using `R`, `Python`, and `Perl`, resulting in three first author publications [1, 3, 2].
- Collaborated with students, professors and other academics from the Anthropology, Health Sciences, Mathematics, and Statistics departments to complete complex problems related to molecular genetics, infectious disease, and ancient DNA in a timely and reliable manner.

- Managed undergraduate student research projects by providing vision, critical thinking, and direction regarding experimental design, research, and task distribution resulting in a successful projects.
- Concisely communicated scientific research to field specific, public audiences, and funding agencies of over 230 people at 4 international conferences, culminating in overwhelming positive oral and poster presentation feedback.
- Awarded National and local funding for research by editing and writing grants outlining the proposed and completed research on bacterial genomic evolution.
- Generated progress reports for funding agencies tracking research projects, cost and inventory of research materials, and summary of the investigation, resulting in renewal of grants.

Research Student May - Aug 2014
Department of Biology, McMaster University, Hamilton, ON, Canada

- Comprehensive training in bioinformatic software and high performance computing such as `Python`, `R`, and Unix command line.
- Conducted computational research on the molecular evolution of mutations in the bacteria *Sinorhizobium* using sequence analysis and phylogenetics.
- Presented research, methods, and results to 250 people at a Biology Symposium at McMaster University.

Research Student May - Aug 2013
Surgical Oncology, University of Toronto, Toronto, ON, Canada

- Completed extensive clinical/health data and literature reviews in the surgical oncology field.

Research Student May - Aug 2012
Motherisk, The Hospital for Sick Children, Toronto, ON, Canada

- Acquisition and analysis of clinical/health administrative data from Primary Care Electronic Medical Record, datasets, and surveys to determine the impacts of maternal genetic testing and adverse infant effects resulting in a second author publication [4].

PUBLICATIONS

[1] Lato, D. F. and Golding, G. B. (2020). Spatial patterns of gene expression in bacterial genomes. *J Mol Evol*, 88:510–520.

[2] Lato, D. F. and Golding, G. B. (2021a). Genomic Inversions and Their Impact on Escherichia coli Gene Expression. *In Prep: Genome Biol Evol.*

[3] Lato, D. F. and Golding, G. B. (2021b). The Location of Substitutions and Bacterial Genome Arrangements. *Genome Biol Evol*, 13.

[4] Moretti, M. E., Lato, D. F., Berger, H., Koren, G., Ito, S., and Ungar, W. J. (2017). A cost-effectiveness analysis of maternal CYP2D6 genetic testing to guide treatment for postpartum pain and avert infant adverse events. *Pharmacogenomics J.*

CODING AND HIGH PERFORMANCE COMPUTING

R	**Unix/Linux**	**bash**
R-shiny	**Bio-Conductor**	**zcsh**
Python	**LaTeX**	**Markdown**
BioPython	**Perl**	**HTML**
Git/GitHub	**tcsh**	

TEACHING

Teaching Assistant Sep 2015-Apr 2021
Department of Biology, McMaster University, Hamilton, ON, Canada
Introduction to Bioinformatics

Teaching Assistant Sep 2015-Apr 2021
Department of Biology, McMaster University, Hamilton, ON, Canada
Genetics

Guest Lecture Mar 2018
Department of Biology, McMaster University, Hamilton, ON, Canada
Molecular Evolution

Workshop Leader *McMaster University, Hamilton, ON, Canada* Mar 2017

High School Plant Molecular Biology Lab Workshop Mar 2017
Department of Biology

Software Carpentry Leader Mar 2017
Command line, `Git`, and `R`

Education Employee Jun 2015 - Aug 2015
Education, Toronto Zoo, Scarborough, ON, Canada
Conservation Biology and Ecology

Teaching Assistant May 2014 - Aug 2014
Department of Mathematics and Statistics, McMaster University, Hamilton, ON, Canada
Differential Equations

CONFERENCES/PANEL DISCUSSIONS

Oral Presentation Virtual, 2021
3MT
Ontario Ecology Ethology and Evolution

Oral Presentation Virtual, 2021
3MT
Graduate Research Day, McMaster University

Career Panel Virtual, 2021
Science, Health and Medicine
St. Brother Andre Catholic High school Alumni Career Panel

Poster Presentation Manchester, UK 2019
Mutation Rate Evolution
Society for Molecular Biology and Evolution Conference

Oral Presentation Hamilton, ON, Canada 2019
Evolutionary Biology / Molecular Evolution
Ontario Ecology, Ethology, and Evolution Colloquium

Oral Presentation Chicago, IL, USA 2018
Evolution and Comparative Genomics COSI
Intelligent Systems for Molecular Biology Conference

Panellist Hamilton, ON, Canada 2018
EngSci Girl
Women In Science and Engineering (WISE), McMaster University

CERTIFICATES

Human Rights, Equity, Accessibility, Respect Toolkit Workshop Series Nov 2020
McMaster University, Hamilton, ON, Canada

HONORS AND AWARDS

Graduate Research Day 3MT Talk Winner 2020 - 2021
Department of Biology, McMaster University
$200 CAD

Therese Quigley Award of Excellence for Graduate Student Leadership in Athletics 2017 - 2021
Graduate Student Recognition Awards, McMaster University
$200CAD

Dr. Edna Guest Award for Graduating Athlete of the Year 2020
Annual Athletic Awards, McMaster University
$1,000 CAD

McMaster Marauder Athlete Scholar 2012 - 2020
McMaster Univeristy Department of Athletics

All Canadian Award for Outstanding Average While on a Competitive University Sports Team 2012 - 2020
Canadian University Synchronized Swimming League (CUSSL)

Biology Travel Scholarship 2018-2019
Department of Biology, McMaster University
$500 CAD

GSA Travel Assistance Award 2019
School of Graduate Studies, McMaster University
$500 CAD

Monica Scarabello Memorial Bursary 2016 - 2018
McMaster University
$500 CAD

Evolution and Comparative Genomics Subsidy 2018
International Society for Computational Biology
$475 USD

RTO/ERO Scholarship 2017
Retired Teachers of Ontario (RTO)
$1,500 CAD

Robert John Morris Graduate Studies Bursary 2016
McMaster University
$1,500 CAD

McMaster Synchronized Swimming Club VIP 2016
McMaster University

Dean's Honor List 2012 - 2015
McMaster University

Dr. Joachim Sparkuhl Undergraduate Research Award in Genomics, Genetics and Other Biological Sciences 2014
McMaster University
$7,680 CAD

SELECT VOLUNTEER EXPERIENCE

Let's Talk Science Sep 2017 - Apr 2021
McMaster University, Hamilton, ON, Canada
Educate students aged 4-18 in science, technology, engineering, and math (STEM) by delivering interactive experiments and activities accessibly to the Hamilton youth.

McMaster Synchronized Swimming Varsity Team Sep 2014 - Apr 2020
McMaster University, Hamilton, ON, Canada

Novice Program Coach Sep 2019 - Apr 2020
Assist swimmers in establishing individual goals, prepare them for competition and foster a positive environment by developing and facilitating practice plans, workouts and comprehensive competition

packages for a range of swimming abilities, including those who are new to the sport. The team is ranked 2nd in Eastern Canada and 6th Nationally.

Vice President Sep 2014 - Sep 2015, Sep 2018 - Sep 2019

Assist and advise President on delegating, organizing competition registration, travel and accommodations, practices, uniforms, and participation fees by researching and completing administrative tasks.

President Sep 2015 - Sep 2018

Responsible for 84 competitive athletes and 8 coaches resulting in a successful and healthy 4 years as an varsity organization which can be seen by the steady registration rate and over 20 medals and podium finishes. This was implemented through the organization of competition registration, diligent record-keeping, travel and accommodations, practices, uniforms, and club budget.

Meet Manager Nov 2016

Organized, scheduled, and executed the Canadian University Synchronized Swimming League National Competition at McMaster University, with a total of 22 Universities and 450 athletes and coaches from all over Canada in attendance.

SNAP (Special Needs Assistance Program) Sep 2016 - Apr 2019

McMaster University, Hamilton, ON, Canada

Assist community members who have cognitive and/or physical disabilities in completing physical exercise by providing creative physical assistance, personalized workout plans, and emotional support which resulted in a 77% increase in gross motor capabilities.

Judge for Biology Undergraduate Symposium (BUS) Sep 2017 - Sep 2018

Department of Biology, McMaster University, Hamilton, ON, Canada

Critically judge final year Theses and Projects of undergraduate STEM students by reviewing the literature and asking thought provoking questions of the participants, analyzing a total of 187 studies.

BGSS (Biology Graduate Student Society) Sep 2016 - Aug 2017

Department of Biology, McMaster University, Hamilton, ON, Canada

Assisted with planing, organizing, and running 15 social and academic events for the Biology students at McMaster.

McMaster Arts for Children Sep 2014 - Sep 2015

McMaster University, Hamilton, ON, Canada

Promote the arts and inspire creativity among children by instructing arts and crafts programs that teach appreciation for and expose children to various aspects of the arts in the Hamilton Community.

McMaster Athletes Care Sep 2013 - Sep 2014

McMaster Synchronized Swimming Club, McMaster University, Hamilton, ON, Canada

Create a space for vulnerable Hamilton youth to engage in sport activities by mentally supporting participants and focusing on local community development.

OTHER WORK EXPERIENCE

Tour Guide *McMaster University, Hamilton* Apr 2017 - Apr 2021