Jarrett D. Phillips, Ph.D.
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EDUCATION

PhD. in Computational Sciences**,** University of Guelph 2016-2022
Co-Advisors: Dr. Daniel Gillis and Dr. Robert Hanner

Master of Bioinformatics (MBinf.), University of Guelph 2013-2014
Co-Advisors: Dr. Robert Hanner and Dr. Daniel Ashlock

BSc. (Hons.) in Biological Science, University of Guelph 2009-2013

RELEVANT COURSEWORK

An Introduction to Interactive Programming in Python 2014
Rice University

- Online course through Coursera on the development of interactive applications in Python

Introduction to DNA Barcoding 2013
University of Guelph

- Online course through Open Learning and Education Support (OpenEd)

RESEARCH EXPERIENCE

Postdoctoral Fellow 2023
University of Guelph
Gillis Lab, School of Computer Science
Hanner Lab, Department of Integrative Biology

- Developed a Bayesian hierarchical binary logistic time-series regression model of seafood fraud in the Canadian supply chain

Postdoctoral Fellow 2022
University of Guelph
Hanner Lab, Department of Integrative Biology
Supervisor: Dr. Robert Hanner

- Mentored and supervised a Master of Bioinformatics (MBINF.) student on research project
- Participated in conceptualization and drafting of various manuscripts

Summer Research Assistant 2016
Algoma University
Plant and Soil Ecology Lab, Department of Biology
Invasive Species Research Institute (ISRI)
Supervisor: Dr. Pedro Antunes

- Offered bioinformatics and statistical analysis support in R
- Assisted Principal Investigator and undergraduate thesis student with initial drafting of a manuscript on invasive plant root lesion quantification

Lab Assistant Volunteer 2014-2016
Algoma University
Plant and Soil Ecology Lab, Department of Biology
Invasive Species Research Institute (ISRI)
Supervisor: Dr. Pedro Antunes

- Offered bioinformatics and statistical analysis support in R
- Assisted with collaborative and outreach initiatives for the Terrestrial Invasive Plant Species (TIPS) Network Project through drafting communication letters to public and private conservation agencies across Canada and the USA seeking volunteers to collect invasive plant species for root lesion quantification

Undergraduate Research Assistant 2013
University of Guelph
Vaccine Discovery Research Group
Supervisor: Dr. Mario Monteiro

- Performed various experimental techniques (gas chromatography-mass spectrometry (GC-MS) and Nuclear Magnetic Resonance (NMR)) on bacterial polysaccharide samples for vaccine synthesis and development under the supervision of qualified graduate students

TEACHING EXPERIENCE

Graduate Teaching Assistant (GTA) 2016-2020
University of Guelph
CIS*3130 – System Modelling and Simulation 2020
~ 30 students · Python
CIS*1910 – Discrete Structures in Computing I 2017
~ 300 students (~ 40 students per section)
CIS*2460 – Modelling of Computer Systems 2016-2019
~ 60 students · R, Excel, Java

STUDENT SUPERVISION AND MENTORSHIP

I have directly supervised and mentored several undergraduate students in the School of Computer Science and the Department of Integrative Biology, all of whom are, or will be, coauthors on my publications. My primary role has been to guide students through the entire scientific process (*i.e.*, formulating research questions, designing and setting up experiments to test hypotheses, collecting data and analyzing results and writing the manuscript drafts). Students completed research both as part of a course and as lab volunteers.

Zaid Al-Gayyali (with Dan Gillis) 2023
University of Guelph
Summer Undergraduate Research Assistant (URA) · Bayesian modelling of seafood fraud in the Canadian supply chain
Fynn De Vuono-Fraser (with Dan Gillis) 2023
University of Guelph
STAT*4600 · Bayesian modelling of seafood fraud in the Canadian supply chain
Amina Asif (with Bob Hanner) 2022
University of Guelph
BINF*6999 · DNA barcode gap analysis of Canadian disease vectors and agricultural pests

Navdeep Singh (with Dan Gillis) 2021
University of Guelph
CIS*4900 · HACSim RShiny web application
Maya Persram (with Bob Hanner) 2020-present
University of Guelph
Hanner Lab volunteer · R reporting ecological meta-analysis
Ashley Chen (with Bob Hanner) 2020-present
University of Guelph
Hanner Lab volunteer · R reporting ecological meta-analysis
Olivia Friesen Kroeker (with Bob Hanner) 2020-present
University of Guelph
Hanner Lab volunteer · R reporting ecological meta-analysis
Scarlett Bootsma (with Dan Gillis) 2020-2021
University of Guelph
CIS*4900/4910 · HACSim simulation study
Christina Fragel (with Bob Hanner) 2018-2019
University of Guelph
BINF*6999 · DNA barcode sequence classification with machine learning
Jiaojia (Paula) Yu (with Bob Hanner) 2018-2019
University of Guelph
BINF*6999 · MDMAPR qPCR R Shiny app
Steven French (with Dan Gillis) 2018
University of Guelph
CIS*4900/4910 · HACSim R package
Julia Harvie (with Bob Hanner) 2018-2019
University of Guelph
MCB*4500/4510 · Data mining GenBank and BOLD
Ankita Bhanderi (with Bob Hanner) 2018
University of Guelph
BINF*6999 · Data mining GenBank and BOLD

ASSISTANTSHIPS, SCHOLARSHIPS AND GRANTS

Graduate Teaching Assistantships 2017-2020
University of Guelph $34,506.00-35,148.00 CAD
Graduate Research Assistantships 2017-2019
University of Guelph $11,000.00 CAD
CPES Graduate Dean's Scholarship 2017
University of Guelph $3500.00 CAD

- Awarded in recognition of achieving over 85% in Master's coursework

CPES Graduate Excellence Entrance (GEE) Scholarship 2016
University of Guelph $30000.00 CAD
- Awarded in recognition of achieving over 85% in Master's coursework

Arthur D. Latornell Graduate Travel Grant 2019
University of Guelph $500.00 CAD
- Awarded for first-class academic standing in PhD. coursework
- Supported travel to the 8th International Barcode of Life Conference in Trondheim, Norway to present work related to resource management and conservation

SoCS Travel Grant 2019
University of Guelph $1000.00 CAD
- Supported travel to the 8th International Barcode of Life Conference in Trondheim, Norway

Food from Thought Advancing Research Impact (ARIF) Fund 2022
University of Guelph $30000.00 CAD
- Postdoctoral funding to develop a Bayesian hierarchical binary logistic time-series regression model of seafood fraud in the Canadian supply chain

ACADEMIC SERVICE

School of Computer Science (SoCS) Search Committee 2018
University of Guelph
- Associate Professor position in cybersecurity

School of Computer Science (SoCS) Search Committee 2017-2018
University of Guelph
- Two-year contractually-limited Assistant Professor position in cybersecurity

ACADEMIC PEER REVIEW SERVICE

I have served as a reviewer for 16 manuscripts in 8 different journals, both alone or under the guidance of my PhD. supervisors.

Ecology and Evolution (2)	2021-2022
F1000 Research (1)	2022
Frontiers in Ecology and Evolution (2)	2022
Lifestyle Genomics (2)	2022
Mitochondrial DNA Part A (1)	2023
Molecular Ecology Resources (6)	2019-2022, 2023
Molecular Biology Reports (1)	2020
Methods in Ecology and Evolution (1)	2020

I will serve as Guest Editor on the following journal special issues:

International Journal of Environmental Research and Public Health 2022-2023
Mobile Applications for Environment and Health Monitoring (currently on hold)

PROCEEDINGS

I have presented or attended graduate research at four international conferences, including both oral presentations and posters.

8th International Barcode of Life Conference 2019
NTNU University Museum and Norwegian Biodiversity Information Centre
Guelph BioMathematics and Statistics (BioM&S) Symposium
Artificial Intelligence and Machine Learning in Biology 2019
University of Guelph
7th International Barcode of Life Conference 2017
University of Johannesburg
6th International Barcode of Life Conference 2015
University of Guelph

RELEVANT SKILLS

Programming Languages and IDEs
Google Colab · Julia · Python · PyCharm · R · RStudio · TeX

Document Preparation Software, Spreadsheet Applications, Software Management and Version Control
Excel · Git · GitHub · HTML · LaTeX · RMarkdown

Other
JAGS · R Shiny · Stan

SOFTWARE DEVELOPMENT

HACSim (**H**aplotype **A**ccumulation **C**urve **Sim**ulator) · R package · R Shiny web app

- A novel nonparametric stochastic (Monte Carlo) local search optimization method of iteratively generating species' haplotype accumulation curves through extrapolation to assess within-species sampling completeness
- R package and Shiny app respectively available for download through the Comprehensive R Archive Network (CRAN) package repository or at shinyappps.io
- Publication *in PeerJ Computer Science* was one of the top five most viewed papers in the category *Optimization Theory and Computation*

- Has been downloaded over 22000 times (*c*. 643 times per month) since being published in May 2019

VLF (**V**ery **L**ow **F**requency) · R package

- A tool to assess PCR errors, sequencing errors, *etc.* in the form of very low frequency variants, within DNA sequences using a sliding window approach
- R package available for download through CRAN
- Has been downloaded over 33000 times (*c*. 313 times per month) since publication
- Manuscript published in the *Biodiversity Data Journal*

REFEREED WORK

Journal Articles

Citations: 124 · H-index: 4 (According to Google Scholar, as of May 11, 2023)

*****Indicates students under my direct mentorship or supervision

Published or Accepted

6. **Phillips, J.D.**, Athey, T.B.T., Hanner, R.H. and McNicholas, P.D. VLF: An R package for the analysis of very low frequency variant s in DNA sequences. *Biodiversity Data Journal,* e96480. DOI: 10.3897/BDJ.11.e98480.

5. **Phillips, J.D.**, Gillis, D.J. and Hanner, R.H. (2022). Lack of statistical rigor in DNA barcoding likely invalidates the presence of a true species' barcode gap. *Frontiers in Ecology and Evolution*, 10: 859099. DOI: 10.3389/fevo.2022.859099.

4. D'Ercole, J., Dincă, V., Opler, P.A., Kondla, N.G., Schmidt, C.B., **Phillips, J.D.**, Robbins, R., Burns, J.M., Miller, S.E., Grishin, N., Zakharov, E.V., deWaard, J.R., Ratnasingham, S. and Hebert, P.D.N. (2020). A DNA barcode library for the butterflies of North America. *PeerJ*, 9: e11157. DOI: 10.7717/peerj.11157.

3. **Phillips, J.D.**, *French, S.H., Hanner, R.H. and Gillis, D.J. (2020). HACSim: An R package to estimate intraspecific sample sizes for genetic diversity assessment using haplotype accumulation curves. *PeerJ Computer Science*, 6(192): 1-37. DOI: 10.7717/peerj-cs.243.

2. **Phillips, J.D.**, Gillis, D.J. and Hanner, R.H. (2019). Incomplete estimates of genetic diversity within species: Implications for DNA barcoding. *Ecology and Evolution,* 9(5): 2996-3010. DOI: 10.1002/ece3.4757.

1. **Phillips, J.D.**, Gwiazdowski, R.A., Ashlock, D. and Hanner, R. (2015). An exploration of sufficient sampling effort to describe intraspecific DNA barcode haplotype diversity: examples from the ray-finned fishes (Chordata: Actinopterygii). *DNA Barcodes*, 3: 66-73. DOI: 10.1515/dna-2015-0008.

Submitted or Under Revision

1. Young, R.G., *Persram, M., *Friesen, O., *Chen, A., *Yu, J. **Phillips, J.D.** and Hanner, R.H. (Under review). Incomplete and irregular reporting of the R statistical and computing environment highlights the need for citation guidelines to support scientific reproducibility. *PeerJ Computer Science.*

In Preparation or To Be Submitted

3. D'Ercole, J., Dapporto, L., **Phillips, J.D.**, Dincă, V.E., Vila, R., Talavera, G. and Hebert, P.D.N. Macrogenetics of North American butterflies—The impact of Quaternary climatic fluctuations. Targeted for *PNAS.*
2. **Phillips, J.D.**, *Singh, N., Hanner, R.H. and Gillis, D.J. The HACSim R Shiny app: A web interface to estimate specimen sampling sufficiency for species genetic diversity assessment with DNA sequence data. Targeted for *Methods in Ecology and Evolution*.
1. **Phillips, J.D.**, *Bootsma, S.E., Hanner, R.H. and Gillis, D.J. Solving the genetic specimen sample size problem with a local search optimization algorithm. Targeted for *Methods in Ecology and Evolution.*

Book Chapters

Submitted or Under Revision

2. **Phillips, J.D**., Griswold, C.K., Young, R.G., Hubert, N. and Hanner, R.H. A measure of the DNA barcode gap for applied and basic research. Methods in Molecular Biology. Springer.
1. Hubert, N., **Phillips, J.D**. and Hanner, R.H. Delimiting species with single-locus DNA sequences. Methods in Molecular Biology. Springer.

In Preparation or To Be Submitted

N/A

Conference Proceedings

4. Morey, K., Loeza-Quintana, T., **Phillips, J.** and Hanner R. (2023). Haplotype diversity reveals challenges and opportunities for developing targeted detection assays for *COI* in Canadian freshwater fish. Pathways to Increase Standards and Competency in eDNA Surveys (PISCeS).
3. **Phillips, J.D.**, Gillis, D. and Hanner, R. (2019). HACSim: Iterative extrapolation of haplotype accumulation curves for assessment of intraspecific COI DNA barcode sampling completeness Scientific abstracts from the 8th International Barcode of Life Conference, Trondheim, Norway (ed. Torbjørn Ekrem), *Genome*, 62(6): 349-453. Oral presentation.
2. **Phillips, J.D.**, Gillis, D. and Hanner, R. (2017). Intraspecific sample size estimation for DNA barcoding: Are current sampling levels enough? Scientific abstracts from the 7th International

Barcode of Life Conference, Johannesburg, South Africa (ed. M. van der Bank), *Genome*, 60(11): 881-1019. Oral presentation.
1. **Phillips, J.D.**, Gwiazdowski, R.A., Ashlock, D. and Hanner, R. (2015). An exploration of sufficient sampling effort to describe intraspecific haplotype diversity in the ray-finned fishes (Chordata: Actinopterygii). Scientific abstracts from the 6th International Barcode of Life Conference, Guelph, ON., Canada (ed. S.J. Adamowicz), *Genome*, 58(5): 163-303. Poster

NON-REFEREED WORK

I have communicated aspects of my research to non-technical audiences through various online media.

Blog posts

6. **Phillips, J.D.** (2022) Mind the Gap — The DNA Barcode Gap, That Is. Contributed CEPS Research Highlights article (https://www.uoguelph.ca/ceps/news/2022/08/mind-gap-—-dna-barcode-gap).
5. **Phillips, J.D.** (2020). Barcode Cracking. Contributed CEPS Research Highlights article (https://www.uoguelph.ca/ceps/news/2020/02/barcode-cracking).
4. **Phillips, J.D.** (2020). Protecting Biodiversity Through the Lens of Genetic Diversity. Contributed guest post to the blog of Dr. Daniel Gillis (https://danielgillis.wordpress.com/2020/01/30/protecting-biodiversity-through-the-lens-of-genetic-diversity/).
3. **Phillips, J.D.** (2019). IBOL8 and the Midnight Sun. Contributed guest post to the blog of Dr. Daniel Gillis (https://danielgillis.wordpress.com/2019/07/02/reflections-ibol8-and-the-midnight-sun/).
2. **Phillips, J.D.** (2017). The Big Five and IBOL7. Contributed guest post to the blog of Dr. Daniel Gillis (https://danielgillis.wordpress.com/2017/12/06/reflections-the-big-five-and-ibol7/).
1. **Phillips, J.D.** (2016). Sample size estimation for DNA barcoding: Are current sampling levels enough? Contributed guest post to the DNA Barcoding Blog (http://dna-barcoding.blogspot.com/2016/01/guest-post-sample-size-estimation-for.html).

Newsletters

1. **Phillips, J.D.** (2016). Sample size estimation for DNA barcoding of ray-finned fishes: Are current sampling levels enough? Contributed newsletter article to the Barcode Bulletin, 7(1).

VOLUNTEER EXPERIENCE

1. Wireframing session volunteer 2021
University of Guelph

- Participated in student-led use case app prototype demonstrations for CIS*3750 – System Analysis and Design in Applications
- Graded students based on several factors via Qualtrics surveys

REFERENCES

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