

Rebecca Batstone

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IGB Postdoctoral Fellow

Institute for Genomic Biology (IGB)
Infection Genomics for One Health Theme
University of Illinois, Urbana-Champaign

EDUCATION

University of Toronto (UofT) Doctor of Philosophy, Department of Ecology and Evolutionary Biology – Advisor: Megan Frederickson – Committee: John Stinchcombe, Arthur Weis	2012–2018
Memorial University of Newfoundland (MUN) Master of Science, Department of Biology – Advisor: Suzanne Dufour – Committee: Paul Snelgrove, Duncan McIlroy	2010–2012
Memorial University of Newfoundland (MUN) Bachelor of Science (Honours), Department of Biology – Advisor: Paul Snelgrove	2006–2010

ACADEMIC CONTRIBUTIONS

Publications

10. **Batstone, R. T.**, O'Brien, A. M., Harrison, T. L., & Frederickson, M. E. (2020) Experimental evolution makes microbes more cooperative with their local host genotype. *Science*, 370(6515): 476-478. [Impact factor = 41.845]
9. Zhang, X., Wang, L., Li, J., **Batstone, R. T.**, & Frederickson, M. E. (2020) *Medicago truncatula* adjusts root proliferation, nodule formation, and partner choice to cope with local N-heterogeneity. *Plant & Soil*, 450(1): 417-428. [Impact factor = 2.969]
8. Baucon, A., Bednarz, M., Dufour, S., . . . , **Batstone, R. T.**, Bernardini, F. & Briguglio, A. (2020). Ethology of the trace fossil Chondrites: Form, function and environment. *Earth-Science Reviews*, 202: 102989. [Impact factor = 9.530]
7. **Batstone, R. T.**, Peters, M. A. E., Simonsen, A. K., Stinchcombe, J. R., & Frederickson, M. E. (2020). Environmental variation impacts trait expression and selection in the legume-rhizobium symbiosis. *American Journal of Botany*, 107(2): 195-208. [Impact factor = 2.788]
6. **Batstone, R. T.**, Carscadden, K. A., Afkhami, M. E., & Frederickson, M. E. (2018). Using niche breadth theory to explain generalization in mutualisms. *Ecology*, 99(5): 1039-1050. [Impact factor = 4.809]
5. **Batstone, R. T.**, Dutton, E. M., Wang, D., Yang, M., & Frederickson, M. E. (2017). The evolution of symbiont preference traits in the model legume *Medicago truncatula*. *New Phytologist*, **213**(4): 1850-1861. [Impact factor = 7.672]

4. **Batstone, R. T.**, & Dufour, S. C. (2016). Closely related thyasirid bivalves associate with multiple symbiont phylotypes. *Marine Ecology*, **37**(5): 988-997. [Impact factor = 1.138]
3. Laurich, J. R., **Batstone, R. T.**, & Dufour, S. C. (2015). Temporal variation in chemoautotrophic symbiont abundance in the thyasirid bivalve *Thyasira* cf. *gouldi*. *Marine Biology*, **162**(10): 2017-2028. [Impact factor = 2.391]
2. Dufour, S. C., Laurich, J. R., **Batstone, R. T.**, McCuaig, B., Elliott, A., & Poduska, K. M. (2014). Magnetosome-containing bacteria living as symbionts of bivalves. *The ISME Journal*, **8**(12): 2453-2462. [Impact factor = 9.302]
1. **Batstone, R. T.**, Laurich, J. R., Salvo, F., & Dufour, S. C. (2014). Divergent chemosymbiosis-related characters in *Thyasira* cf. *gouldi* (Bivalvia: Thyasiridae). *PloS One*, **9**(3): e92856. [Impact factor = 3.234]

Selected presentations

Since 2010, I have presented at fourteen (14) international conferences, in countries including the US and Canada as well as Sweden, Brazil, Germany, and France, and have been invited to give several talks at universities across the states. [P] = poster, all others are oral presentations.

- **Batstone, R. T.**, & Heath, K. D. (2021). From genomes to symbiotic phenotypes: mechanisms of adaptation through conflict and cooperation in a model mutualism. Department of Biological Sciences' Seminar Series at Binghamton University, Feb 26th.
***Invited speaker**
- **Batstone, R. T.**, & Heath, K. D. (2021). From genomes to symbiotic phenotypes: mechanisms of adaptation through conflict and cooperation in a model mutualism. Organisms and Evolution Seminar Series in the Department of Biology at Duke University, Feb 18th.
***Invited speaker**
- **Batstone, R. T.**, & Heath, K. D. (2020). From genomes to symbiotic phenotypes: mechanisms of adaptation through conflict and cooperation in a model mutualism. Seminar Series in the Department of Ecology and Evolutionary Biology, University of Pittsburgh, Sept 23.
***Invited speaker**
- **Batstone, R. T.**, Harrison, T. L., O'Brien, A. M., & Frederickson, M. E. (2020). Experimental evolution results in rapid adaptation of rhizobia to their local legume host. American Society of Naturalists stand-alone meeting 2020, Jan 03-07, Pacific Grove, California, USA.
***One of four postdoc talks to receive an honorable mention**
- **Batstone, R. T.**, Harrison, T. L., O'Brien, A. M., & Frederickson, M. E. (2019). Experimental evolution reveals rapid local adaptation of rhizobia to legumes. Evolution Conference 2019, June 21-25, Providence, Rhode Island, USA.
***Invited speaker: finalist for the W. D. Hamilton Award (\$500)**
- **Batstone, R. T.**, & Frederickson, M. E. (2018). Experimentally evolving better partners: rapid evolution of cooperative traits in rhizobia associating with choosy legumes. 2nd Joint Congress on Evolutionary Biology, Aug 18-22, Montpellier, France. [P]
- **Batstone, R. T.**, & Frederickson, M. E. (2017). Rapid evolution of nodulation and partner quality in a legume-rhizobium mutualism. The Biology and Economics of Mutualism Workshop, Nov 1-3, Plön, Germany.
- **Batstone, R. T.**, Dutton, E. M., Wang, D., Yang, M., Ahmad, A., & Frederickson, M. E. (2016). Root foraging and mutualism-stabilizing traits in *Medicago truncatula*. Canadian Society for Ecology and Evolution, July 7-11, Memorial University, Newfoundland, Canada.
***Won 1st place for best student oral presentation (\$500)**
- **Batstone, R. T.**, Wang, D., Yang, M., Ahmad, A., & Frederickson, M. E. (2015). Root foraging and mutualism stability in the model legume *Medicago truncatula*. Evolution Conference, June 26-30, Guarujá, Brazil.

- **Batstone, R. T.**, Laurich, J. R., & Dufour, S. C. (2012). Uncovering a species complex of thyasirid clams (Bivalvia: Thyasiridae) from a subarctic fjord in Bonne Bay, Newfoundland. 1st Joint Congress on Evolutionary Biology, July 6-10, Ottawa, Canada.
 - **Batstone, R. T.**, & Dufour, S. C. (2011). The relationship between thyasirid (Bivalvia: Thyasiridae) ventilation behavior and sediment redox cycles. 'Benthic processes in a globally changing environment', 3rd Nereis Park Conference, Aug 29-31, Kristineberg Marine Research Station, Fiskebäckskil, Sweden. [P]
 - **Batstone, R. T.**, & Dufour, S. C. (2011). Understanding the ecology and evolution of thyasirids (Bivalvia: Thyasiridae) from organically enriched habitats in Newfoundland. Aldrich Interdisciplinary Conference, Feb 22-23, Memorial University, Newfoundland, Canada.
- *Won the Student Affairs and Services Award for Research in Sustainability (\$600)**

SCHOLARSHIPS AND AWARDS

Research Scholarships

Cumulative total ~ 250K USD or 330K CAD	2009–Present
Carl R. Woese Institute for Genomic Biology Postdoctoral Fellowship, UIUC – Additional 7K per year for research funds – Working closely with Dr. Katy Heath (Plant Biology Department)	2018–2021 \$196,500 USD total
Ontario Graduate Scholarships Graduate Research Award, UofT – Awarded in recognition of academic excellence	2015–2017 \$45,000 CAD total
Zimmerman-Weis Award in Ecology and Evolutionary Biology Graduate Field Research Award, UofT – Awarded for research conducted at the Koffler Scientific reserve	2014–2015 \$4,750 CAD
RDC Ocean Industries Student Research Awards Graduate Research Award, MUN – Additional 3K in research funds	2011–2012 \$13,333 CAD
Centenary of Responsible Government Scholarship Undergraduate Award, MUN	2009–2010 \$1,000 CAD

Awards and Recognition

• P. A. Abrams Award: \$250 CAD, academic excellence	2018
• H. H. Harvey Prize: \$500 CAD, academic service	2017
• Ramsay Wright Award: \$500 CAD, academic excellence	2016
• Centre for Global Change Science Award: \$1,831 CAD, travel for Evolution conference	2015
• Outstanding Teaching Award: Most effective lab instructor for BIO220	2014
• Endowment Awards: \$11,569 CAD total, various donors	2013–2018
• H. H. Harvey Travel Grants: \$2000 CAD total, travel for conferences	2013–2017
• SGS Conference Grant: \$500 CAD, travel for conference in California	2013

TEACHING AND MENTORSHIP

Cumulative teaching experience = 1,410 hrs

2010–Present

- **Instructor** at University of Illinois, Urbana-Champaign Fall 2020
Evolution (IB372) - one term
 - I developed this inquiry-based course involving both asynchronous and synchronous activities to guide students through the scientific process (e.g., generating and testing hypotheses, presenting results to the class).
 - I designed guides for reading primary research articles and research presentations that students could use as resources throughout my course.
- **Laboratory instructor** at University of Toronto (UofT) 2013-2018
Genomes to Ecosystems (BIO220) - six terms
 - I helped design and then led several long-term experiments that students were required to set up, collect data on, analyze and visualize the data, and finally, discuss their results with the class.
 - I won the “Outstanding Teaching Assistant Award” in 2014, based on being rated as a highly effective instructor by my students.
- **Laboratory instructor** at UofT 2012-2017
Adaptation and Biodiversity (BIO120) - four terms
 - I led hands-on activities that ranged from live insect handling (the Madagascar hissing cockroaches really got the students attention!), to running gels, and building phylogenetic trees, all designed to give students experience with hypothesis generation and testing.
 - I guided students through the process of writing a scientific proposal, which involved them having to submit an initial version, receive feedback, and then revise accordingly.
- **Teaching assistant** at UofT Fall 2014
Plant-Animal Interactions (EEB440) - one term
 - I led hands-on activities including nature walks, games, and experiments, and evaluated students’ research proposals.
- **Teaching assistant** at Memorial University (MUN) Summer 2012
Benthic Biology (BIOL3712) - one term
 - I assisted the course instructor with developing and then running this two-week intensive field course located at the Bonne Bay Marine Station in Newfoundland.
 - I helped students set up short-term experiments, and evaluated their assignments.
- **Teaching assistant** at MUN Spring 2012
Marine Biology (BIOL4810) - one term
 - For this field course at the Bonne Bay Marine stations, I helped students set up their own independent projects that involved trouble-shooting methods, analyzing data, and presenting their results to the rest of the class.
- **Teaching assistant** at MUN Winter 2011
Biology of the Vertebrates (BIOL2210) - one term
 - I helped lead the lab-component of the course that involved students conducting activities on both preserved and live specimens from different taxonomic groups.
- **Teaching assistant** at MUN Fall 2010
Principles of Marine Biology (BIOL3711) - one term
 - I prepared and gave three one-long lectures in partial fulfilment for the “Graduate Program in Teaching”, and helped with marking student assignments and exams.

Guest lectures

• UIUC: Guest lecturer for IGB's 'Training in Team Science' course (IB299)	Spring 2020
• UIUC: Panelist for the Honors course IB270 (Evolution of Cells and Molecules)	Fall 2019
• UIUC: Co-led population genomics activity for IB405 (Ecological genetics)	Spring 2019
• UofT: Panelist at the Careers in Research in Ecology and Evolution workshop	Fall 2014
• UofT: Guest speaker for EEB488 (Research Issues in Ecology and Evolutionary Biology)	Spring 2014
• UofT: Guest lecturer for EEB321 (Community Ecology)	Fall 2013
• UofT: Presenter at the 'Careers in Research in Ecology and Evolution' workshop	Fall 2012
• MUN: Guest lecturer for BIOL4810 (Benthic Biology) at the Bonne Bay Marine Station	Spring 2010

Graduate Program in Teaching

Certification based on attending weekly seminars, and giving 3 hr-long guest lectures	Fall 2010
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Mentorship

I've had the privilege of directly supervising eleven (11) undergraduate students, five of whom are fellow coauthors on several of my publications (denoted with an *). My role has mostly involved guiding students through the entire scientific process (i.e., coming up with a research question, experimental design and set-up, data collection and analysis, and writing up the results). For every student below, I have also provided feedback on their written work, including both research proposals and final term papers/theses.

11. **James Kosmopoulos**, UIUC, IB390 2019–Current
Project: Variation in partner quality of Ensifer meliloti outside of the root nodule.
 Won two undergraduate research scholarships based on his outstanding research proposal
10. **Laura Goralka**, UIUC, IB490 2018–2019
Project: Genetic variance in antibiotic resistance in Rhizobium leguminosarum
 Received 'High Distinction' on her senior thesis
9. **Daniel Li**, UofT, EEB397 2017–2018
Project: Determining how the environment and partner choice shapes rhizobial diversity.
8. **Judith Li**, UofT, EEB397 2016–2017
Project: Does micro-heterogeneity in the nitrogen environment affect partner choice in the legume-rhizobium symbiosis?
***Publication no. 9**
7. **Xue Zhang**, UofT, EEB397 2016–2017
Project: Effects of nitrogen heterogeneity on the legume-rhizobia mutualism.
***Publication no. 9**
6. **Carol Chen**, UofT, ROP299 2015–2016
Project: The effect of genotypic variation of Medicago truncatula on strain proportion of Ensifer meliloti over time.
5. **Luxiang Wang**, UofT, CGSC summer intern 2015–2016
Project: The effect of N heterogeneity on the legume-rhizobium mutualism.
 Won the Centre for Global Change Science research scholarship based on his outstanding proposal
***Publication no. 9**
4. **Aadiyat Ahmad**, UofT, EEB498 2014–2015
Project: Mutualism stability and the evolution of sanctions of Medicago truncatula
3. **Madeline Peters**, UofT, ROP299 2014–2015
Project: Examining the role of partner choice in natural populations of Medicago lupulina
***Publication no. 7**
2. **Shree Senthivasan**, UofT, EEB397 2013–2014

Project: Making it big as a freeloader: Accounting for the persistence of ineffective rhizobial partners in the legume-rhizobia symbiosis.

1. **Molly Yang**, UofT, ROP299 2012–2013
Project: The implications of root nitrogen foraging in Medicago truncatula on legume-rhizobia mutualism stability.
***Publication no. 5**

I additionally worked with volunteers and part-time undergraduate employees:

- **Volunteers**, UofT 2014–2017
 Recruited and managed 35 undergraduate volunteers who helped me conduct my research
- **Work-Study program**, UofT 2013–2018
 Interviewed and managed 17 paid undergraduates who helped me conduct my research
- **Women in Science and engineering Program**, MUN 2009–2010
 Mentored two high-school students who worked over the summer at the Harp Seal Research Facility

ACADEMIC SERVICE

Conference organization and volunteering

- Moderator for the Evolution Community Resources for Early Career Researchers (ECR²) series Summer 2020
- UIUC: Co-organiser of the IGB's Fellow's Symposium Spring 2019
- Symposium co-organiser for the CSEE Conference in Victoria, BC, Canada Summer 2017
- Volunteer at the Evolution Conference in Guarujá, Brazil Summer 2015
- UofT: Co-organiser of the EEB dept's Atwood Colloquium Spring 2015
- MUN: Volunteer at the Aldrich Interdisciplinary Conference Spring 2011

Science Outreach

- **Virtual Genome Day** Fall 2020
 Converted Microbia to an online version for kids K-G8
- **Genome Day**, Franklin STEAM academy, Champaign, IL Fall 2019
 Coordinated a team of postdocs, grad students and faculty to present Microbia to kids and their families
- **Science Café**, Urbana, IL Spring 2019
 Presented Microbia to adults participating in IGB's monthly outreach event at Café & Co.
- **World of Genomics**, Washington, DC Spring 2019
 Debuted Microbia at IGB's annual outreach event at the National Academy of Sciences
- **Microbia, the game**, UIUC Spring 2019
 Designed a game (Microbia) to teach participants of all ages about microbes and mobile DNA
- **Let's Talk Science**, Canada 2010–2014
 Volunteer for Let's Talk Science Outreach Program to engage kids G2-6 in fun science activities

EEB Graduate Student Association positions (UofT)

- **Treasurer** 2015–2017
 Applied and was awarded the head grant that funds all EGSA activities
 Completed all paperwork related to EGSA spending accounts
- **Secretary** 2014–2015
 Recorded and distributed meeting minutes

- **Head of Fundraising** 2013–2014
Coordinated events throughout the year including:
lab coat sales, charity raffle, and the Philippines Disaster Fund
- **Charity Committee** 2012–2014
Helped raise money for the Toronto Wildlife Centre

Manuscript Reviews

Reviewed a total of 20 manuscripts in 14 different journals:

- *Plant & Soil, Acta Oecologica, AmNat* 2020
- *New Phytologist, Evolution, Environmental Microbiology* 2019
- *FEMS Microbiology Letters, Proceedings B Royal Society, Royal Society Open Science, AmNat, Oecologia, PLoS ONE* 2018
- *Molecular Ecology, The American Naturalist (AmNat), Oecologia* 2017
- *New Phytologist, Journal of Ecology, AJB* 2016
- *American Journal of Botany (AJB)* 2015

REFEREES

Dr. Katy Heath (current Postdoctoral advisor)

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Dr. John Stinchcombe (PhD committee member)

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Dr. Suzanne Dufour (Master's Advisor)

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Dr. Jill Wheeler (Course and Lab Coordinator, BIO120/220)

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