Benjamin Furman

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Ph.D. Candidate, Evans Lab,
Department of Biology
McMaster University
Hamilton, Ontario
Canada

Education

2012 – Pres. **Ph.D. Candidate**, *McMaster University*, Hamilton, Ontario, Canada, Ben Evans Lab.
Evolutionary Genetics, transferred from M.Sc. with distinction

2008 – 2012 **B.Sc.**, *University of Alberta*, Edmonton, Alberta, Canada.
Specialization in Animal Biology

Research

Ph.D. Dissertation — My research focused on evolutionary genomic analyses of African clawed frogs (*Xenopus*). In particular, I investigated newly evolved sex chromosomes and, in a comparative framework, evaluated divergent evolutionary histories of different homomorphic sex chromosome systems. I have also explored the genomic responses to whole genome duplication, including rates of gene loss and impacts on purifying selection across multiple *Xenopus* species. As well, I assessed speciation, hybridization, and basic phylogeography of both endangered and common species of *Xenopus*. Overall, these projects have involved a wide array of sequencing techniques (whole genome, reduced representation, transcriptome and Sanger sequencing), field work in Africa, and generating numerous lab-reared *Xenopus* families.

B.Sc. Thesis — I conducted a fine-scale genetic analysis of a wood frog population inhabiting an urban environment. The goal was to understand how urbanization impacts connectivity of populations and the role that artificial wetlands play in maintaining gene flow. This project involved field collections and microsatellite sequencing and analysis.

Publications

Google Scholar profile here.

Grey journal titles link to PDFs.

Furman, B. L. S., Cauret, C. M. S., Colby, G. A., Measey, J., and Evans, B. J. (2017) Limited genomic consequences of hybridization between two African clawed frogs, *Xenopus gilli* and *X. laevis* (Anura: Pipidae). *Scientific Reports* 7(1), 1091.

Furman, B. L. S. and Evans, B. J. (2016) Sequential turnovers of sex chromosomes in African clawed frogs (*Xenopus*) suggest some genomic regions are good at sex determination. *Genes, Genomes and Genetics (G3)* 6(11), 3625–3633.

Furman, B. L. S., Scheffers, B. R., Taylor, M., Davis, C., and Paszkowski, C. A. (2016) Limited genetic structure in a wood frog (Lithobates sylvaticus) population in an urban landscape inhabiting natural and constructed wetlands. *Conservation Genetics* 17(1), 19–30.

Furman, B. L. S., Bewick, A. J., Harrison, T. L., Greenbaum, E., Gvoždík, V., Kusamba, C., and Evans, B. (2015) Pan-African phylogeography of a model organism, the African clawed frog *Xenopus laevis*. *Molecular Ecology* 24(4), 909–925.

Scheffers, B. R., **Furman, B. L. S.**, and Evans, J. P. (2013) Salamanders continue to breed in ephemeral ponds following the removal of surrounding terrestrial habitat. *Herpetological Conservation and Biology* 8(3), 1–9.

Furman, B. L. S., Scheffers, B. R., and Paszkowski, C. A. (2011) The use of fluorescent powdered pigments as a tracking technique for snakes. *Herpetological Conservation and Biology* 6(3), 473–478.

Scholarships

2015 – 2018 **Natural Sciences and Engineering Research Council Alexander Graham Bell Canada Graduate Scholarship (CGS-D)**, $105 000, Academic and Research Achievement, National Scholarship.

2014 – 2015 **Clifton W. Sherman Ontario Graduate Scholarship**, $15 000, Academic and Research Achievement, Provincial Scholarship.

2013 – 2014 **The Joseph and Joanne Lee Ontario Graduate Scholarship**, $15 000, Academic and Research Achievement, Provincial Scholarship.

2012 **University of Alberta Undergraduate Scholarship**, $750, Academic Achievement, University Scholarship.

2011 **Jason Lang Scholarship**, $1 000, Academic Achievement, Provincial Scholarship.

2010 **Jason Lang Scholarship**, $1 000, Academic Achievement, Provincial Scholarship.

Awards And Certificates – monetary and non-monetary

2017 **McMaster Biology Department Achievement Award**, *Monetary*, Best publication of the year in ecology and evolution.

2016 **McMaster Teaching Assistant Award, nomination**, *Non-monetary*, Nominated by students.

2016 **McMaster Biology Department Travel Award**, $1 600, Conference travel.

2015 **McMaster Biology Graduate Research Day Presentation**, *Non-monetary*, Honorable mention best presentation.

2015 **McMaster Biology Department Achievement Award**, *Monetary*, Best publication of the year in ecology and evolution.

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2015 **McMaster Biology Department Travel Award**, $1 000, Conference travel, declined.

2014 **McMaster Biology Department Achievement Award**, *Non-monetary*, Departmental involvement.

2014 **McMaster Biology Department Travel Award**, $850, Conference travel.

2014 **Principles and Practicing of University Teaching**, *Non-monetary*, Graduate level certificate course in university level teaching.

Teaching & Mentorship

2012 – Pres. **Teaching Assistant:** Biol 3SO3 Introduction to Bioinformatics, Biol 4DD3 Molecular Evolution, Biol 3FF3 Evolution, Biol 3SS3 Population Ecology

2015 **Teaching Assistant**: Ontario Universities Program in Field Biology course in Tanzania. Field Ecology.

Other

- Guest lecturer fourth year Molecular Evolution (Biol 4DD3)
- Guest lecturer first year introductory biology (Biol 1A03)
- Mentoring numerous fourth year undergraduate student thesis projects
- Mentoring many volunteer undergraduate students

Community Involvement

2016 – Pres. IUCN Amphibian Specialist Group Canada member

2016 – Pres. LaTeX adviser with Overleaf (a collaborative writing platform, with an emphasis on scientific writing)

2013 - 2017 Organizing committee member for Department of Biology Graduate Student Research Day

2013 – 2017 Judge for The Biology Undergraduate Symposium

2013 – 2015 Associate Editor – *Journal of Student Science and Technology* (formerly *Canadian Young Scientists Journal*)

2013 – 2015 President of the Biology Graduate Students Society

2013 – 2015 Department of Biology Graduate Student Studies Committee member

2012 – 2013 Outreach Coordinator Biology Graduate Student Society

Academic Peer Review

Reviewer for: Molecular Biology and Evolution, Molecular Ecology, PeerJ, PloS One, Journal of Applied Ecology

Select Conference Presentations

(* indicates presenter)

***Furman, B. L. S.** and Evans, B. J. (2016) Talk: Sequential turnovers of sex chromosomes in African clawed frogs (*Xenopus*) suggest some genomic regions are good at sex determination. *Evolution* Austin, Texas, USA. Video, Slides.

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***Furman, B. L. S.** and Evans, B. J. (2015) Talk: Sex Chromosoe Evolution in *Xenopus*. *Canadian Herpetological Society* Saint John, New Brunswick, Canada.

***Furman, B. L. S.** and Evan, B. J. (2014a) Talk: Phylogenetics of Polyploid African Clawed Frogs Using RNAseq; Inferences for Sex Chromosome Evolution. *Genomes to Biomes* Montreal, Quebec, Canada.

***Furman, B. L. S.** and Evan, B. J. (2014b) Talk: Phylogenetics of Polyploid African Clawed Frogs Using RNAseq; Inferences for Sex Chromosome Evolution. *OE3C* Guelph, Ontario, Canada.

*Evans, B. J., Bewick, A. J., Chain, F. J. J., **Furman, Benjamin L S**, Wiens, J., and Pyron, A. (2013) Talk: Sex Chromosoe Evolution in Frogs. *Society for Molecular Biology and Evolution* Chicago, Illinois, USA.

***Furman, B. L. S.**, Bewick, A. J., and Evans, B. J. (2013) Poster: Sex Chormosomes in *Xenopus borealis*. *Evolution* Snowbird, Utah, USA.

***Furman, B. L. S.**, Davis, C., and Paszkowski, C. A. (2012) Talk: Fine-scale genetic analysis of wood frogs in an urban landscape. *University of Alberta Undergraduate Thesis Symposia* Edmonton, Alberta, Canada.

***Furman, B. L. S.** (2011) Poster: The use of fluorescnet powdered pigments as a tracking technique for snakes. *University of Alberta Undergraduate Research Synposium* Edmonton, Alberta, Canada.

Skills

Sequencing and Analyses	Illumina (whole genome, GBS, RADseq, RNAseq) and Sanger sequence analysis, phylogenetics, general evolutionary analyses, variant calling and mutation discovery
Computation	Perl, R, R/Shiny, LaTeX, Git, Bash, Cloud/cluster computing
Laboratory	PCR, primer design, Sanger sequence prep, gel electrophoresis, DNA/RNA extraction, cloning (genes and microsatellites), maintaining large scale amphibian housing and care facility
Field	Radio telemetry, fluorescent trailing, amphibian and reptile capture, tagging and tissue collection, some bird and small mammal experience, biodiversity monitoring (water quality, soil sampling, lichen survey, bird/amphibian call surveys), work in remote areas and foreign countries

Field Excursions

2017	Kenya. Sampling *Xenopus borealis* and *X. victorianus* (and other amphibians) to assess sex linkage of the new sex determining system we found (see this publication) in wild populations. Also, we aim to address the claims of a hybrid zone between these species.
2016	Ghana. Sampling *X. tropicalis* and *X. fishcbergi*, but also collecting other amphibian species encountered to explore genetic structure and assess sex linkage in wild populations.
2014	Argentina. Sampling *Octodontidae* rodents to explore a possible mammalian genome duplication. Included museum sampling and wild captures.

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2012 South Africa. Sampling *X. laevis* populations from across the country to explore genetic structure and species delineation. These efforts resulted in a publication.

Work Experience

May – Sept. 2012 **Field Technician**, *Alberta Biodiversity Monitoring Institute*, Biodiversity Monitoring.

- Province wide field work
- Soil and water sampling
- Bird call recording
- Aquatic and terrestrial sampling
- Invertebrate, lichen, moss, plant sampling and identification
- Bird and amphibian identification

April – Oct. 2011 **Research Assistant**, *University of Alberta*, Worked with Murdoch Taylor (M.Sc.) and Cynthia Paszkowski (Ph.D.), Amphibian Research.

- Radio telemetry
- Adult capture
- Call and egg mass surveys
- Water quality assessment

May – July 2010 **Field Biologist**, *Parks Canada*, Jasper National Park, Amphibian Population Monitoring.

- Amphibian monitoring study
- Public education on amphibians
- Bird netting and banding
- Adult, larval stage and Egg mass identification
- Data management

April – Sept. 2009 **Research Assistant**, *University of Alberta*, Worked with Brett Scheffers (Ph.D.) and Cynthia Paszkowski (Ph.D.), Amphibian and Reptile Research.

- Snake and amphibian tracking with fluorescent powder
- Pit fall trapping
- Survey of all life stages for snakes and amphibians
- Amphibian call surveys

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