Joseph McGirr, PhD

Evolutionary Biologist
Postdoctoral Researcher

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Summary

I'm a bioinformatics scientist specializing in evolutionary genetics and population biology. I have a Ph.D. in biology from the University of North Carolina and have published research in prominent journals including *Molecular Biology and Evolution, Evolution Letters,* and *Molecular Ecology*. My projects combine evolutionary theory with next generation sequencing data to answer questions at the intersection of basic and applied research. I am passionate about science communication and making new discoveries accessible to a wide audience.

Education

University of North Carolina, Chapel Hill	2015-2020	Ph.D. Biology
University of Colorado, Colorado Springs	2010-2014	B.S. Biology *magna cum laude*

Experience

2020 - **Postdoctoral Researcher, Whitehead Lab, Dept. of Environmental Toxicology, University of California, Davis, CA**

- Used temporal genomic contrasts and demographic inference to understand population recovery.
- Identified cross-species differential gene expression in response to osmotic stress.

2015-2020 **PhD Student, Martin Lab, Dept. of Biology, University of North Carolina, Chapel Hill, NC**

- Research on the genetic basis of adaptive traits and reproductive isolation in young species.
- Identification of novel candidate genes influencing craniofacial development.
- Discovered alleles under divergent selection contributing to gene misregulation in hybrids.
- Taught labs in evolution, animal behavior, anatomy, and course-based undergraduate research (CURE).

Skills

Code: R, python, bash.
Bioinformatics: Illumina whole genome and transcriptome alignment, annotation, and SNP calling with BWA, STAR, Trinity, GATK, samtools, ANGSD and R-Bioconductor packages.

Computing: SLURM, Amazon EC2, LSF, Snakemake, git.

Statistics: Linear and mixed models, classical stats, GWAS, genetic demographic modeling.

Bench: Designed and performed CRISPR/Cas9 gene editing experiments.

Funding and Awards

2020	NSF-XSEDE Startup Allocation: The impacts of the Exxon Valdez oil spill on Pacific herring population collapse and lack of recovery in Prince William Sound, Alaska. $2,000
2018	Triangle Center for Evolutionary Medicine Graduate Fellowship. $10,500
2017	Rosemary Grant Travel Award, Society for the Study of Evolution. $1,630
2017	L.I. Gilbert Travel Award, University of North Carolina Chapel Hill. $750
2017	Best Graduate Student Presentation, Southeastern Population Ecology and Evolutionary Genetics (SEPEEG) Conference. $100
2015	NSF Graduate Research Fellowship Program: Honorable Mention.
2014	College of Letters, Arts, and Sciences Research Award, University of Colorado Colorado Springs. $1,500

Presentations and Invited Seminars

2020 Invited Speaker. Wainwright Lab Seminar. University of California. Davis, CA.

2020 Public Defense. University of North Carolina Department of Biology. Chapel Hill, NC.

2019 Contributed talk. Society for the Study of Evolution meeting. Providence, RI.

2018 Invited speaker. Research in Progress Seminar Series. East Carolina University. Greensville, NC.

2018 Contributed talk. Society for Integrative and Comparative Biology meeting. San Francisco, CA.

2017 Contributed talk. Southeastern Population Ecology and Evolutionary Genetics Conference. Laurel Hill, NC.

2017 Contributed talk. Society for the Study of Evolution meeting. Portland, OR.

Publications

In review Richards EJ, **McGirr JA**, Wang J, St. John ME, Poelstra JW, et al. Major stages of vertebrate adaptive radiation are assembled from a disparate spatiotemporal landscape. ***bioRxiv*** *preprint* doi.org/10.1101/2020.03.12.988774

2020 **McGirr JA** and Martin CH. Few fixed variants between trophic specialist pupfish species reveal candidate *cis*-regulatory alleles underlying rapid craniofacial divergence. ***Molecular Biology and Evolution*** doi.org/10.1093/molbev/msaa218

2020 **McGirr JA** and Martin CH. Ecological divergence in sympatry causes gene misregulation in hybrids. ***Molecular Ecology*** 29: 2707– 2721.

2019 Martin CH, **McGirr JA**, Richards EJ, St. John ME. How to investigate the origins of novelty: insights gained from genetic, behavioral, and fitness perspectives. ***Integrative Organismal Biology.*** doi.org/10.1093/iob/obz018

2019 **McGirr JA** and Martin CH. Hybrid gene misregulation in multiple developing tissues within a recent adaptive radiation of *Cyprinodon* pupfishes. ***PLoS One***. 14(7): e0218899.

2019 St. John ME, **McGirr JA,** and Martin CH. The behavioral origins of novelty: did increased aggression lead to scale-eating in pupfishes? ***Behavioral Ecology***. 30:557–569.

2018 **McGirr JA** and Martin CH. Parallel evolution of gene expression between trophic specialists despite divergent genotypes and morphologies. ***Evolution Letters***. 2:62–75.

2017 Turissini DA, **McGirr JA**, Patel SS, Matute DR. The rate of evolution of postmating-prezygotic reproductive isolation in *Drosophila*. ***Molecular Biology and Evolution***. 35:312–344.

2017 **McGirr JA** and Martin CH. Novel candidate genes underlying extreme trophic specialization in Caribbean pupfishes. ***Molecular Biology and Evolution***. 34:873–888.

2017 **McGirr JA**, Johnson LM, Kelly W, Markow TA, Bono JM. Reproductive isolation among *Drosophila arizonae* from geographically isolated regions of North America. ***Evolutionary Biology***. 44:82–90.

Outreach

MarineOmics working group: Member of a committee providing guidance on applying genomic tools in marine science while emphasizing data availability, code accessibility, and reproducibility.

Graduate student peer mentor: Mentored first year graduate students entering the Biological and Biomedical Sciences Program at UNC. Helped develop departmental talks, write manuscripts, and navigate their first year at UNC.

Contributor to the Scientific Research and Education Network (SciREN): Developed and distributed a high school lesson plans based on my research with the help of educators from North Carolina K-12 schools.

DNA Day volunteer: Taught DNA related lesson plans in three classes (ranging 9-11 grade) at a rural high school in NC.

Darwin Day volunteer: Annual science fair open to the public held at the North Carolina museum of natural history.