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Personal Statement

As an undergraduate researcher, I learned the fundamentals of genomics and employed computational approaches to answer biological questions for the first time. During my graduate training, I combined my enthusiasm for bioinformatics and neuroscience by investigating the role of language-related transcription factor FOXP2 in neural development using next-generation sequencing approaches, including analyzing single-cell genomics data. As a postdoc at MSU, I leverage my diverse training to facilitate collaborative research between experimental and computational groups, including building computational tools that integrate diverse data from thousands of sources. My biology training drives me to always keep underlying biological principles in mind when designing computational experiments. In fact, because I am a biologist, I am uniquely suited to build transparent, interpretable models of biological phenomena rather than “black box” models where the relationship between input data and the output of the model is opaque. I aim to ensure the results of the computational approaches I design are biologically meaningful and useful for experimental biologists.

Education

2011-2018	**Ph.D.**, Neuroscience **University of Texas Southwestern Medical Center**, Dallas, TX Dissertation mentor: Genevieve Konopka, Ph.D. Dissertation project: Understanding the conserved and species-specific functions of FOXP2.
2006-2011	**B.S.**, Biochemistry, *Summa cum laude* **University of Oklahoma**, Norman, OK Thesis Mentor: Bruce A. Roe, Ph.D. Thesis project: Comparative genomics of five *Leptospira* Species provides insights into the virulence factors of *Leptospira kirschneri* serovar *grippotyphosa.*
Fall 2008	**Visiting student,** St. Catherine’s College **University of Oxford**, Oxford, UK Psychology focus

Research Experience

2019-*present* **Michigan State University,** *Postdoctoral Researcher*
Laboratory of Arjun Krishnan, Ph.D., Department of Biochemistry and Molecular Biology & Department of Computation, Mathematics, Science and Engineering (CMSE)

- Developing new computational approaches that combine single-cell and bulk genomic data to study gene regulation.
- Leveraging natural language processing to identify unbiased cell-type marker genes.

2018-2019 **UT Southwestern Medical Center,** *Postdoctoral Researcher*
Laboratory of Genevieve Konopka, Ph.D., Department of Neuroscience

- Completed single-cell RNA-sequencing analysis that uncovered changes in cell type composition and gene expression upon cortical *Foxp2* deletion.
- Performed comparative transcriptomics analyses using data from bulk tissue and single cells to provide evidence for a human specific role for *FOXP2* in the developing human cortex.

2011-2018 **UT Southwestern Medical Center,** *Graduate Research Assistant*
Laboratory of Genevieve Konopka, Ph.D., Department of Neuroscience

- Investigated the role of language-related transcription factor FOXP2 in human neural development using next-generation sequencing approaches.
- Used ATAC-seq to show that FOXP2 regulates gene expression via two distinct mechanisms.
- Identified an enrichment of FOXP2 activated targets among genes correlated with the subplate during human cortical development.

2007-2011 **University of Oklahoma,** *Undergraduate Research Assistant*
Laboratory of Bruce A. Roe, Ph.D., Department of Chemistry and Biochemistry

- Learned the fundamentals of whole genome shotgun sequencing from harvesting genomic DNA to contig alignment and analysis.
- Utilized bioinformatic tools to compare bacterial genomes and identify unique virulence factors in *Leptospira kirschneri* serovar *grippotyphosa.*

Publications

A. Mitra, A.-M. Raicu, **S.L. Hickey**, L.A. Pile, D.N. Arnosti, (2021). “Soft repression: Subtle transcriptional regulation with global impact”. *Bioessays*, 43, e2000231.

S.L. Hickey, S. Berto, and G. Konopka (2019). “Chromatin decondensation by FOXP2 promotes human neuron maturation and expression of neurodevelopmental disease genes”. *Cell Rep* **27**(6): 1699-1711

M. Co, **S.L. Hickey**, A. Kulkarni, M. Harper, G. Konopka (2019). “Cortical Foxp2 supports behavioral flexibility and developmental dopamine D1 receptor expression.” *Cerebral Cortex*, bhz209, doi: 10.1093/cercor/bhz209

G. Z. Wang, **S. L. Hickey**, L. Shi, H. C. Huang, P. Nakashe, N. Koike, B. P. Tu, J. S. Takahashi and G. Konopka (2015). "Cycling Transcriptional Networks Optimize Energy Utilization on a Genome Scale." *Cell Rep* **13**(9): 1868-1880

S. Lepp., A. Anderson and G. Konopka (2013). "Connecting signaling pathways underlying communication to ASD vulnerability." *Int Rev Neurobiol* **113**: 97-133.

Presentations

S.L. Hickey, A. Yannakopoulos, A. Krishnan (2020). "Unbiased marker gene identification using NLP and the Cell Ontology". Lightning talk: *Michigan Regional Postdoc Symposium*, Oct.7, virtual.

S.L. Hickey, A. Yannakopoulos, A. Krishnan (2020). "Unbiased marker gene identification using NLP and the Cell Ontology". Lightning talk: *Michigan State University & University of Michigan Women + Data Science Webinar*, Nov. 19, virtual.

S.L. Hickey, S. Berto, and G. Konopka (2016). "FOXP2 modifes the chromatin landscape of developing human neurons." Poster presentation: *Society for Neuorscience Annual Meeting*, Nov.12-16, San Diego, CA.

S.L. Hickey, S. Berto, and G. Konopka (2016). "FOXP2 modifes the chromatin landscape of developing human neurons." Poster presentation: *Systems Biology: Global Regulation of Gene Expression,* March 15–March 19, Cold Spring Harbor, NY.

Awards

Trainee Early-career Award for Mentoring in Unexplored Problems – TEAM-UP (2019)
Department of Biochemistry and Molecular Biology, Michigan State University, East Lansing, MI

Best Student or Postdoc Talk (2018)
"FOXP2 employs separable mechanisms to regulate human subplate gene expression"
UT Southwestern Neuroscience Program Retreat

Training grant (2013)
NIDA T32DA07290, Basic Training Program in Drug Abuse, Amelia J. Eisch, PhD PI.

Phillips Award for Outstanding Undergraduate Research (2011)
Department of Chemistry and Biochemistry, University of Oklahoma, Norman, OK

Mentorship

Summer 2020 **Masters Essay Supervisor**
African Institute for Mathematical Sciences (AIMS), Rwanda
- Designed and supervised an applied mathematics project for AIMS student, Mangaliso Lihle Dlamini.
- Edited and marked his resulting essay, *Prediction of Cell Type Specific Networks of Autism Spectrum Disorder.*

Fall 2020 **Rotation Student Supervisor**
Krishnan Lab, Michigan State University
- Supervised Biochemistry and Molecular Biology graduate student, Robert Fidis, during his rotation in the Krishnan Lab.
- Trained him to identify differentially expressed genes from RNA-seq data using EdgeR.

Fall 2018 **Rotation Student Supervisor**
Konopka Lab, UT Southwestern Medical Center
- Supervised Neuroscience graduate student, Emre Caglayan, during his rotation in the Konopka Lab.
- We collaborated to estimate RNA velocity in single-cell RNA-seq data from the developing mouse striatum.

Leadership

2021-*present* **R-Ladies East Lansing**
Co-organizer
- R-Ladies is a worldwide organization whose mission is to promote gender diversity in the open-source R community.
- We organize monthly meetings for R-users of all proficiency levels to discuss, learn, teach, present, and work on all things R.

2019-*present* **CMSE Postdoc Association**
Co-founder and chair
- Facilitates communication between CMSE postdocs and MSU administration
- Represents CMSE postdocs in the MSU Postdoc Association
- Co-organizes the monthly CMSE Postdoc Seminar – Postdoc "Thunder Talks"

2012-2017 **Women's Mentoring Series Committee**, Dallas, TX
Seminar organizer and team leader
- Recruited female faculty members to share their personal career paths with female trainee scientists.
- Increased seminar series attendance by 20% by introducing new seminar formats and discussion topics.

2012-2017 **Irving High School Science Fair Outreach**, Irving, TX
Co-founder, organizer, and mentor
- Assisted organizing a series of presentations that taught students how to conceive, carry out, and explain their science fair projects.
- Coached two students through the planning and execution of their prize-winning project.

References

Arjun Krishnan, Ph.D.
Assistant Professor, Computational Science, Mathematics and Engineering
& Biochemistry and Molecular Biology
Michigan State University
arjun@msu
517-432-0372
Relationship: Postdoc mentor

David Arnosti, Ph.D.
Professor, Biochemistry and Molecular Biology
Michigan State University
arnosti@msu.edu
517-432-5504
Relationship: Collaborator

Genevieve Konopka, Ph.D.
Associate Professor, Neuroscience
UT Southwestern Medical Center
genevieve.konopka@utsouthwestern.edu
214-648-5136
Relationship: Thesis mentor