

Tara N. Furstenau, Ph.D.

Contact

The School of Informatics,
Computing, and Cyber Systems
Northern Arizona University
PO Box 5693
Flagstaff, AZ 86011

Email:

tara.furstenau@nau.edu

Website:

<http://tfursten.github.io>

Github:

<https://github.com/TFursten>

Bitbucket:

<https://bitbucket.org/TaraFurstenau>

Skills

Programming Languages

Proficient: C++, Python, R

Familiar: Julia, Mathematica,
Rust, SQL

Visualization

Matplotlib, Seaborn, Lattice,
ggplot2, ggtree, Graphviz

Markup & Typesetting

HTML, Markdown, \LaTeX

Systems

Unix, Linux, Windows,
Macintosh OS X

Other

Version Control Systems: Git,
Github, Bitbucket

Research Experience

- 2016–Present **Postdoctoral Scholar** in Viacheslav Fofanov's lab
The School of Informatics, Computing, and Cyber Systems
Northern Arizona University · Flagstaff, AZ
- 2013–2016 **Graduate Student** in Reed Cartwright's Lab
Center for Human and Comparative Genomics · The Biodesign Institute
Arizona State University · Tempe, AZ
- 2010–2013 **Research Associate** in Roberto Gaxiola's Lab
School of Life Sciences · Arizona State University · Tempe, AZ
- 2009–2010 **Undergraduate Student Researcher** in Lei Lei's Lab
School of Life Sciences · Arizona State University · Tempe, AZ

Education

- 2010–2016 **Ph.D.** in Molecular and Cellular Biology Arizona State University
Advisor: Reed Cartwright
Dissertation: Spatial Genetic Structure under Limited Dispersal:
Theory, Methods and Consequences of Isolation-by-Distance
- 2008–2010 **B.S.** in Bioinformatics and Genomics Arizona State University
Dean's List · *magna cum laude*

Publications

Furstenau, TN, and RA Cartwright (2017). The impact of self-incompatibility systems on the prevention of biparental inbreeding. *PeerJ* 5:e4085 [doi:10.7717/peerj.4085](https://doi.org/10.7717/peerj.4085)

Furstenau, TN, and RA Cartwright (2016). The effect of the dispersal kernel on isolation-by-distance in a continuous population. *PeerJ* 4:e1848. [doi:10.7717/peerj.1848](https://doi.org/10.7717/peerj.1848)

Pizzio GA, Paez-Valencia J, Khadilkar AS, Regmi K, Patron-Soberano A, Zhang S, Sanchez-Lares J, **Furstenau T**, Li J, Sanchez-Gomez C, Valencia-Mayoral P, Yadav UP, Ayre BG, and RA Gaxiola (2015). *Arabidopsis* proton-pumping pyrophosphatase AVP1 expresses strongly in phloem where it is required for PPI metabolism and photosynthate partitioning. *Plant Physiology* 167:1541-1553. [doi:10.1104/pp.114.254342](https://doi.org/10.1104/pp.114.254342)

Submitted

Furstenau, TN, Cocking, J, Sahl, JW, and VY Fofanov. Variant Site Strain Typer (VaST): Efficient strain typing using a minimal number of variant genomic sites. Submitted to *BMC Bioinformatics*.

Fofanov, VY, **Furstenau, TN**, Sanchez D, Hepp, C, Cocking, J, Sobek, C, Pagel, N, Walker, F, and CL Chambers. Guano exposed: Impact of aerobic conditions on bat fecal microbiome. Submitted to *Methods in Ecology and Evolution*.

Scientific Software

VaST	V ariant Site S train T yper: An algorithm which finds the minimum number of variant genomic sites for strain differentiation. Python · https://github.com/FofanovLab/VaST
NbMCMC	Bayesian inference of neighborhood size (N_b) using composite marginal likelihoods Python · https://github.com/tfursten/nbmcnc
SI-Sim	Self-Incompatibility Simulation: A spatially explicit individual-based model of a diploid plant population that reproduces according to five different models of self-incompatibility. C++ · https://github.com/tfursten/SI-cpp
IBD-Sim	Isolation-by-distance simulation: A spatially explicit individual-based simulation to model dispersal on a lattice using different dispersal distribution functions. C++ · https://github.com/tfursten/IBD

Funding

Current

2016–2018	An Amplicon Sequencing Solution for Environmental Biothreat Detection. Grant: DHS Bio Threat-Seq Award: \$2,524,859.80 PI: Jason Sahl Role: Senior Personnel
2017–2018	High Confidence Metagenomics Analyses of Complex Samples Using Informative Read Alignments Grant: DHS Award: \$392,000 PI: Viacheslav Fofanov Role: Senior Personnel

Pending

2018–2020	A Tool for Designing Massively Multiplexed PCR-Amplicon Sequencing Panels for Bacterial and Viral Strain Resolution from Complex Samples Grant: NSF ABI Innovation Award: \$664,618 PI: Viacheslav Fofanov Role: Co-I/Major Contributor
2018–2019	Defining Microbiological Drivers of Early Childhood Caries in Preschoolers in Southern Arizona Grant: NIH R21 Award: \$452,879 PI: Viacheslav Fofanov Role: Contributor

Presentations

Talks

May 2017	Strain-level pathogen identification using targeted PCR amplicon sequencing The Biodefense and Disease Ecology Center Meeting The Pathogen and Microbiome Institute · Flagstaff, AZ
Dec 2015	Spatial genetic structure under limited dispersal Informatics and Computing Program · Flagstaff, AZ

- Sep 2015 Bayesian estimation of neighborhood size using composite marginal likelihoods
Molecular and Cellular Biology Colloquium · The Biodesign Institute · Tempe, AZ
- July 2015 Bayesian estimation of neighborhood size using composite marginal likelihoods
Society for Molecular Biology and Evolution · Vienna, Austria
- Sep 2014 Evolution of Self-Incompatibility: Investigating the role of self-incompatibility systems in the prevention of biparental inbreeding
Molecular and Cellular Biology Colloquium · The Biodesign Institute · Tempe, AZ
- Oct 2013 Evolution of Self-Incompatibility: Investigating the role of self-incompatibility systems in the prevention of biparental inbreeding
Molecular and Cellular Biology Colloquium · Arizona State University · Tempe, AZ
- March 2012 The roll of the H⁺-pyrophosphatase in the regulation of sucrose transport in plants
Molecular and Cellular Biology Colloquium · Arizona State University · Tempe, AZ

Posters

- June 2017 Effects of Exposure on Bat Guano Microbiome
Microbiome Bioinformatics with QIIME 2 Workshop · Las Vegas, NV
- June 2017 Preemptive establishment of baseline bat microbiome diversity before White-Nose Syndrome strikes the Southwest
Microbiome Bioinformatics with QIIME 2 Workshop · Las Vegas, NV
Presented by Nicole Pagel (Graduate Student Mentee)
- June 2014 The effect of the dispersal distribution on isolation-by-distance in a continuous population
Society for the Study of Evolution · Raleigh, NC
- March 2014 Characterization of Transgenic *Arabidopsis thaliana* overexpressing *AVP1* and *PLAFP*
Arizona State University Undergraduate Research Poster Symposium · Tempe, AZ
Presented by Sean Wilson (Undergraduate Student Mentee)
- Aug 2012 H⁺-PPase AVP1 is necessary for phloem development in *Arabidopsis thaliana*
Molecular and Cellular Biology Graduate Student Retreat · Tempe, AZ
- July 2012 H⁺-PPase AVP1 is necessary for phloem development in *Arabidopsis thaliana*
American Society of Plant Biologists Annual Meeting · Austin, TX

Teaching Experience

Courses:

Arizona State University

Fall 2014	BIO340 General Genetics	Head Teaching Associate
Spring 2014	BIO355 Introduction to Computational Molecular Biology	Innovative Teaching Associate
Fall 2013	PLB108 Concepts in Plant Biology iCourse	Instructor
Spring 2013	BIO340 General Genetics	Teaching Associate
Fall 2012	BIO340 General Genetics	Teaching Associate

Spring 2012	BI0340 General Genetics	Teaching Associate
Fall 2011	BI0340 General Genetics	Teaching Associate
Summer 2011	BI0181 General Biology I Laboratory	Teaching Associate
Spring 2011	BI0182 General Biology II Laboratory	Teaching Associate
Fall 2010	MBB343 Genetic Engineering and Society Laboratory	Teaching Associate

Northern Arizona University

Spring 2017	INF503 Large-Scale Data Structures and Organization	Guest Lecture
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Workshops:

May 2016	Software Carpentry Instructor	Biodesign Institute · ASU · Tempe, AZ
June 2015	Software Carpentry Helper	Wrigley Institute of Sustainability · ASU · Tempe, AZ

Mentoring:

2011–2013	Sean Wilson Undergraduate Honor's Thesis Thesis: Wilson S, Furstenau T , and R Gaxiola. Characterization of Transgenic <i>Arabidopsis thaliana</i> Over-expressing a Type I H ⁺ -Pyrophosphatase and the Phloem Lipid-Associated Family Protein.
2016–2017	Michael Deberg Undergraduate Student
2017–Present	Jun Rao Graduate Student

Service and Outreach

Software Carpentry Certified Instructor
 Night of the Open Door Volunteer
 Ask-A-Biologist Volunteer Correspondent
 Green Labs Initiative Coordinator and Promoter
 Phosphorus Sustainability Research Coordination Network Core Participant
 Obama Scholars Mentor

Professional Development

June 2017	Microbiome Bioinformatics with QIIME 2 Workshop QIIME Development Team · Las Vegas, NV
July 2013	Next Generation Population Genomics for Non-model Taxa Workshop American Genetics Association · Cornell University · Ithaca, NY
Dec 2011	Univector Plasmid-Fusion System training with Kendal Hirschi Childrens Nutritional Research Center · Baylor College of Medicine · Houston, TX

Society Memberships

Society for the Study of Evolution
 Society for Molecular Biology and Evolution
 Central Arizona Chapter of the Association for Women in Science