

ZOE FORREST ELKINS, PH.D.

Data Scientist

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EDUCATION

Ph.D. in Biological Sciences (Quantitative Genetics)

University of Missouri-Columbia

Aug 2016 – Dec 2022 Columbia, MO

Dissertation: The evolution and genetic basis of complex traits in *Drosophila melanogaster*

Advisor: Dr. Elizabeth G. King

B.S. in Computer Science & Psychology

Drake University

Aug 2012 – May 2016 Des Moines, IA

PROFESSIONAL WORK

Data Scientist

VEDA Data Solutions

Mar 2023 – Feb 2025 Remote

- Created, optimized, and automated weekly key performance indices (KPIs) for geolocation software
- Collaborated with software engineers on overhaul of geolocation software
- Performed root-cause and geospatial analyses of geo-location data
- Built out a PostGIS+PostgreSQL database for client healthcare data
- Conceived and implemented a tool to calculate network adequacy based on Centers for Medicare & Medicaid Services (CMS) guidelines
- Created, trained and implemented a machine learning anomaly detection algorithm into an existing software development kit
- Implemented new software features and unit tests with 100% coverage
- Conducted A/B tests between software in development and production environments, and between feature branches
- Developed full-stack KPI performance and interactive geospatial map dashboard microsities for internal stakeholders
- Presented my software improvements and KPI metrics at company All-Hands
- Data:** GeoJSON- and non-GeoJSON-formatted spatial data dictionaries; ESRI ARCGIS, USPS & Smarty address data, health provider data, CMS National Plan and Provider Enumeration System data
- Techs:** Python, SQL, Amazon DynamoDB, Postgres, PostGIS, SQLite, Unit tests, DBeaver, Navicat, VS Code
- Stats:** A/B testing, anomaly detection modeling, unsupervised/supervised machine learning algorithms, regression analyses, root-cause analyses

SOFTSKILLS

Critical Thinking Problem Solving
Open-mindedness Team Work
Adaptability Professionalism
Work Under Pressure
Learning Potential

STRENGTHS

Data Science

Python SQL MLOps R
MATLAB JAVA JavaScript
tidyverse NumPy Pandas
scikit-learn Jupyter notebooks
Git Unix/*nix Bash scripting

Data visualization

GeoPandas ipyleaflet
plotly+mapbox Quarto
CSS/SCSS Markdown

High-throughput computing

SLURM Batch processing

Development Tools – DB

Amazon DynamoDB SQL SQLite
MongoDB PostgreSQL

PROFESSIONAL WORK CONT'D

Science Writer

Columbia Daily Tribune

📅 June 2018 – June 2019

📍 Columbia, MO

- Contributed the weekly 'Ask a Scientist' column to the Columbia Daily Tribune
- Answered science questions from local gradeschool students

Marketing Intern

Health Alliance

📅 May 2014 – Aug 2014

📍 Champaign, IL

- Managed and updated client records on Salesforce
- Participated in call campaigns to update in-network provider data
- **Techs:** Salesforce, Excel

STRENGTHS CONT'D

- Development Tools – IDE & Text Editor

VS Code

DBeaver

Navicat

RStudio

Vim

Emacs

Node.js

XCode

- Machine Learning & Statistics

A/B testing

Supervised & unsupervised ML

Anomaly detection

NLP

Regression analyses

Bayesian analyses

Monte Carlo methods

Artificial neural networks (ANN)

Survivorship analyses

Evolutionary algorithms

GRADUATE WORK

Starvation resistance in an evolved multiparent population of the fruit fly (*Drosophila melanogaster*)

Project lead

📅 Aug 2019 – Dec 2022

- Designed an experiment and collected data at twelve-hour intervals every day for two months
- Managed and mentored an undergraduate student in data collection, management and analysis
- Spearheaded the statistical analysis of our survivorship data
- Interpreted and communicated study results for scientific audiences
- **Techs:** RMarkdown, Tidyverse, Git, PowerPoint
- **Stats:** Kaplan-Meier survival analysis, Cox proportional hazard model, multivariate regression, AIC model comparison

Modeling statistical error due to coverage variation in pooled-sequencing DNA experiments

Project lead

📅 Dec 2022

- Identified opportunity to improve genomic analysis
- Simulated statistical error pipeline in a pooled-sequencing experimental framework due to variation in sequencing coverage
- Simulated data from random probability distributions
- Conducted an analysis of allele estimation across multiple sequencing coverages and calculated statistical error
- **Techs:** Quarto Markdown, Tidyverse, reveal.js, LaTeX, Git
- **Stats:** Binomial sampling, error estimation

Exploration behavior in *D. melanogaster*

Project lead

📅 July 2018 – Dec 2022

- Collaboratively developed experimental design, analyses, and manuscript composition
- Cleaned and prepared genomic data for analysis
- Performed data management of large genomic datasets
- Conducted linear regression and randomization analyses on data
- Visualized data using ggplot2
- **Techs:** RMarkdown, Tidyverse, Bash scripting, GATK/BWA, SLURM, Git, Unix
- **Stats:** Monte Carlo randomization method, FDR/FWER significance testing, null distribution simulation

📄 JOURNAL ARTICLES

- Lazareva, O.F., Paxton Gazes, R., Elkins, Z. et al. Associative models fail to characterize transitive inference performance in rhesus monkeys (*Macaca mulatta*). *Learn Behav* **48**, 135-148 (2020). <https://doi.org/10.3758/s13420-020-00417-6>
- Diamond, P., Elkins, Z., Huff, K., Naylor, L., Schoeberle, S., White, S., Urness, T., Zwier, M. Identifying splice sites of messenger RNA using Support Vector Machines. *Midwest Instruction and Computing Symposium, Conference Proceedings* (2016).

TEACHING

Genetics

Teaching Assistant

📅 Fall 2021 & 2022 📍 U. of Missouri
Taught on topics ranging across the field of genetics to upper-class undergraduate students

Biology for Non-Majors

Teaching Assistant

📅 Fall 2020 & Spring 2022 📍 U. of Missouri
Taught in-person, hands-on laboratory coursework to undergraduate students

Undergraduate Research Mentor

Mentee: Jordyn Moaton

📅 2019 – 2021 📍 U. of Missouri
Topic: statistical analysis of fruit fly survivorship due to starvation

Evolution

Teaching Assistant

📅 Spring 2019 📍 U. of Missouri
Graded coursework and proctored exams for Dr. Elizabeth King's Evolution undergraduate course.

PRESENTATIONS

Oral

The genetic basis and evolution of complex traits in *Drosophila melanogaster*

Dissertation Defense Seminar

 Dec 2022

 Columbia, MO

The genetic basis and evolution of complex traits in *Drosophila melanogaster*

Life Sciences Fellowship Seminar

 2021

 Columbia, MO

Escaping the warming climate: from penguins to fruit flies

Public lecture – Daniel Boone Regional Library

 2019

 Columbia, MO

OUTREACH

Head Representative

Coalition of Graduate Workers

 2018 – 2020

- Led the Coalition of Graduate Workers' Representative Assembly, where I wrote and endorsed resolutions for the Representative Assembly's vote

President

Biology Graduate Student Association

 Jan 2018 – Dec 2019

- Advocated for biology graduate students' interests at the divisional level of the University of Missouri

Regional Coordinator

Out in STEM

 2016 – 2018

- Served as liaison between oSTEM chapters at universities in the Midwest and the global oSTEM organization
- Facilitated programming to make academic environments in STEM more inclusive for members of the LGBTQIA+ community