Daniel R. Kick PhD

Research Geneticst

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In Brief:

- I'm interested in applying statistical and computational tools to better predict and explain biological effects. I aim to use these techniques to improve food security by assisting in generation of cultivates with high yield that are robust to variable weather.
- During graduate school I focused on connecting ion channel mRNA abundances to electrophysiological properties and homeostatic tuning within neurons.
- Now, as a Post-Doc with the USDA-ARS I focus on using deep learning to improve yield prediction by better representing interaction effects between genetic, enviromental, and management effects.

Selected Skills

- R (Tidyverse, Shiny (see source, deployed)
- Python (Pandas, Numpy, Plotly)
- Bash, git, Vim, slurm, basic singularity, basic docker
- Statistics (Parametric, basic Bayesian modeling, Resampling)
- Machine Learning, Deep Learning (Keras, Scikit-learn, Caret)
- Electrophysiology (voltage, current, and dynamic clamp), Microdissection
- Scientific communication, Scientific writing, Figure generation (Inkscape)

Professional Experience

2021-Present **Research Geneticist**, *USDA-ARS*, Responsibilities include: Aggregating, cleaning, and imputing public datasets, tuning and training deep learning models using Keras, assisting an undergraduate run high throughput phenotyping project, and producing scripts to streamline the same. This is a post-doctoral research position overseen by Dr. Jacob D. Washburn..

Education

2021 Ph.D. **University of Missouri, Columbia, MO**, *Coursework included: Grant Writing, Quantitative Methods in the Life Sciences, and Machine Learning Methods for Biomedical Informatics*, (3.97/4 GPA).

2015 B.S. **Truman State University, Kirksville, MO**, *Coursework included: Next Generation Sequence Data and Analysis, Bioinformatics, Analysis of Variance and Experimental Design, Non-Parametric Statistics, and Economic & Medicinal Botany.*, (3.65/4 GPA).

Short Courses and Workshops

2020 **Software Carpentry: Python**, *University of Missouri, Columbia, MO*, Two-day workshop providing hands on experience working with Python, Git, and Unix Shell..

2017 **Diversity & Inclusion Workshop**, *University of Missouri, Columbia, MO*, Six-hour workshop covering implicit bias and inclusive practices..

2016 **Big Data in Biology**, *University of Texas, Austin, TX*, Weeklong short courses in bioinformatics: Introduction to Core NGS Tools and Introduction to RNA-Seq.

Research Experience

2016—2021 **PhD Candidate**, *Dr. David Schulz (University of Missouri)*, Analyzed the efficacy of machine learning methods to reproduce neuron cell types given mRNA abundances. (see Northcutt et al. 2019). • Described regulation of gap junction conductance controlled by timing of activity in the Cancer borealis cardiac ganglion. • Contrasted responses in cell activity, membrane currents, and channel mRNA abundances in response to potassium channel blockade after one or twenty-four hours in the Cancer borealis cardiac ganglion..

2015 **PhD Student**, *Dr. Lorin Milescu (University of Missouri)*, • Devised and tested a protocol for live imaging Drosophila with a two-photon microscope..

2015 **PhD Student**, *Dr. Bing Zhang (University of Missouri)*, • Designed a machine to assay Drosophila climbing (used in Willenbrink et al. 2016) and quantified sleep patterns of Drosophila tyrosine hydroxylase mutants..

2014-2015 **Undergraduate Research Assistant**, *Dr. Diane Janick-Buckner & Dr. Brent Buckner (Truman State University)* , • Prototyped a hydroponic growth chamber for root morphology characterization of maize mutants..

2014 **REU Student**, *Dr. Rahul Kanadia (University of Connecticut)*, • Conduced a pilot study using in situ hybridization which implicated upregulation of the minor spliceosome in postponing retinal cell death. .

2013 **REU Student**, *Dr. Christian Lorsen (University of Missouri)*, • Measured motor function decline in a mouse model of spinal muscular atrophy receiving an oligonucleotide treatment..

2011 **Student Volunteer**, *Dr. Laszlo Kovacs (Missouri State University)*, • Refined a set of teaching labs to be used in a genetics course..

Teaching Experience

- Teaching Assistant (Animal Physiology Lab, University of Missouri)
- Oversaw and coordinated transition of the lab to a hybrid then fully online class model due to Covid-19.
- Adapted and expanded materials to be suitable for remote learning.
- Constructed and deployed a statistics web tool (source, deployed). 2018 – 2021 Curriculum Consultant (Animal Physiology Lab, University of Missouri) 2018
- Updated curriculum and redesigned experiments placing a greater focus primary literature and data analysis.

Teaching Assistant (Animal Physiology Lab, University of Missouri) • Assisted students through experiments. • Provided short weekly lectures. 2015 – 2016”

Honors and Awards

2019 **J. Perry Gustafson Award**, *University of Missouri* , $2000.

2016 –2018 **NIH T32 Training Grant Recipient**, $27,000 yearly.

2017 **NIH T32 Travel Award**, $750.

2016 **NIH T32 Travel Award**, $750.

2015 **Graduated Cum Laude**, *Truman State University*.

Outreach and Communication

2022 **From Neurobiologist to Research Geneticist**, *Invited Presentation, Beyond the PhD*, Virtual.

2022 **Tools and Techniques for a Jupyter Based Scientific Workflow**, *Invited Workshop, Bioinformatics in Plant Science (BIPS)*, University of Missouri.

2019 **Can mRNA expression recapitulate neuron cell types?**, *Alumni Research Presentation*, Truman State University.

2019 **Spare the synapse, spoil the circuit**, *Public presentation, Science on Tap*, Columbia Missouri.

2019 **Voltage Dependent modification of Electrical Synapses**, *Biological Sciences Recruitment Poster Session*, University of Missouri.

2018 **Gap Junction Conductance Modulation Via Voltage**, *Alumni Research Presentation*, Truman State University.

2017 **Please mind the gap: Network homeostatic plasticity in the Cancer borealis cardiac ganglion**, *Alumni Research Presentation*, Truman State University.

2016 **The Tell-Tale Heart: Applying crustacean neurogenic hearts to basic neurosciences questions**, *Alumni Research Presentation*, Truman State University.

2016 **Scientific Poster Judge**, *Spring Undergraduate Research and Creative Achievements Forum*, University of Missouri.

Mentoring

2017 – 2019 **Undergraduate Student**, *Abby Beckerdite.*

2018 – 2018 **NSF REU Student**, *Ayla Ross.*

2017 – 2017 **NSF REU Student**, *Katlyn Sullivan.*

2016 – 2016 **Post-baccalaureate Scholar**, *Rody Kingston.*

2016 – 2016 **NSF REU Student**, *Kelly Hiersche.*

Publications

2022 **Yield Prediction Through Integration of Genetic, Environment, and Management Data Through Deep Learning**, *Daniel Kick, Jason Wallace, James C. Schnable, Judith M. Kolkman, Baris Alaca, Timothy M. Beissinger, David Ertl, Sherry Flint-Garcia, Joseph L. Gage, Candice N. Hirsch, Joseph E. Knoll, Natalia de Leon, Dayane C. Lima, Danilo Moreta, Maninder Singh, Teclemariam Weldekidan, Jacob D. Washburn*, bioRxiv.

2022 **Timing dependent potentiation and depression of electrical synapses contributes to network stability in the crustacean cardiac ganglion**, *Kick, Daniel R. and Schulz, David J.*, Journal of Neuroscience.

2019 **Studying gap junctions with PARIS**, *Kick, Daniel R and Schulz, David J*, Elife.

2019 **Molecular profiling of single neurons of known identity in two ganglia from the crab Cancer borealis**, *Northcutt, Adam J and Kick, Daniel R and Otopalik, Adriane G and Goetz, Benjamin M and Harris, Rayna M and Santin, Joseph M and Hofmann, Hans A and Marder, Eve and Schulz, David J*, Proc. Natl. Acad. Sci. U.S.A..

2018 **Dopamine maintains network synchrony via direct modulation of gap junctions in the crustacean cardiac ganglion**, *Lane, Brian J and Kick, Daniel R and Wilson, David K and Nair, Satish S and Schulz, David J*, Elife.

2018 **Variability in neural networks**, *Daniel R Kick; David J Schulz*, Elife.

Journal of Neurogenetics **The Hillary Climber trumps manual testing: an automatic system for studying Drosophila climbing**, *Alex M. Willenbrink and Margo K. Gronauer and Leon F. Toebben and Daniel R. Kick and Madalyn Wells and Bing Zhang*, 2016.