

# DANIEL R. KICK, PHD

## EDUCATION

2021  
|  
2015

### **PhD. Biological Sciences**

University of Missouri, Columbia, MO

- Coursework included Machine Learning Methods for Biomedical Informatics, Quantitative Methods in the Life Sciences, and Grant Writing

2015  
|  
2011

### **Bachelor of Science**

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

## PROFESSIONAL AND RESEARCH EXPERIENCE

Present  
|  
2021

### **Research Geneticist**

Jacob Washburn Lab, USDA-ARS

- Improved yield prediction of maize in diverse environments by using deep learning to better capture gene by environment effects. Conducted research and wrote manuscript on results. Communicated results to stakeholders through local and national presentations. Supervised undergraduate high throughput phenotyping project and assisted with related coding needs.

2021  
|  
2016

### **Graduate Student**

David Schulz Lab, Missouri State University

- Assessed the efficacy of machine learning models to recapitulate neural cell identity from mRNA expression 1. Demonstrated that activity desynchronization induces degree dependent changes in conductance between neurons 2. Investigated the compensatory effects of elevated depolarization on neuronal excitability, conductances, and ion channel mRNA abundances in small neural networks 3.

2015

### **Graduate Student Rotation**

Loren Milescu Lab, Missouri State University

- Developed a protocol for live imaging neurons in *Drosophila melanogaster* with a two-photon microscope.

2015

### **Graduate Student Rotation**

Bing Zhang Lab, Missouri State University

- Designed a machine to assay *Drosophila* climbing (used in Willenbrink et al. 2016) and quantified sleep patterns of *Drosophila* tyrosine hydroxylase mutants

2014

### **Undergraduate Researcher**

Diane Janick-Buckner, Brent Buckner Lab, Truman State University

- Designed and prototyped a hydroponic growth chamber for maize root phenotyping.

2014

### **NSF REU Student**

Rahul Kanadia Lab, University of Connecticut

- Measured minor spliceosome upregulation using *in situ* hybridization supporting a role in postponing retinal cell death.

## CONTACT INFO

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 [danielkick.com](http://danielkick.com)

 [github.com/danielkick](https://github.com/danielkick)

 [daniel-kick-5a449b9a/](https://www.linkedin.com/in/daniel-kick-5a449b9a/)

 [Google Scholar](https://scholar.google.com/citations?user=0000-0002-9002-1862)

 [0000-0002-9002-1862](https://orcid.org/0000-0002-9002-1862)

## TECHNICAL SKILLS

 R Programming (7 years)  
experience with `tidyverse`,  
`lme4`, `caret`, `ggplot2`, `shiny`,  
& package creation.

 Python Programming

(3 years) experience with  
`pandas`, `numpy`, `plotly`,  
`scikit-learn`, `keras`,  
`pytorch`.

 Miscellaneous

Experience with high performance computing (`bash`, `slurm`), virtual environments (`conda`, `singularity`), version control (`git`, `GitHub`), literate programming (`Quarto`, `Rmarkdown`, `Jupyter`, `nbdev`), crop growth modeling (`APSIM`).

 Neuroscience Research

Experience with **multimodal datasets** (single cell mRNA expression, ionic conductances, and excitability), experimental design, electrophysiology techniques (dynamic, voltage, & current clamp), **creating custom data processing workflows**.

- 2013 • **NSF REU Student**  
Christian Lorson Lab, Missouri State University  
• Assessed motor function in mouse model of spinal muscular atrophy with and without oligonucleotide treatment.
- 2012 • **Camp Counselor & Lifeguard**  
• Responsible for safety, development, and wellbeing of campers.
- 2011 • **Student Assistant**  
Laszlo Kovacs Laboratory, Missouri State University  
• Tested teaching experiments for use in a genetics course.
-  **HONORS AND AWARDS**
- 2025 | 2023 • **NIFA Fellowship (AFRI EWD)**  
[\\$225,000 awarded \(Grant # 2023-67012-39485\)](#) over two years to create and environmentally aware deep learning genomic selection models and prepare the recipient to transition into industry.
- 2022 • **Poster Ranked first in MU Plant Research Symposium poster competition**
- 2019 • **J. Perry Gustafson Award for Outstanding Graduate Research in the Life Sciences**  
This [\\$2,000 award](#) is granted for the quality of their research and academic achievements.
- 2018 | 2016 • **NIH T32 Training Grant Recipient**  
This provides a \$27,000 yearly stipend and \$750 yearly to facilitate presenting research at scientific conferences.
- 2015 • **Cum Laude & President's Recognition, Truman State University**
-  **PROFESSIONAL ACTIVITIES**
- 2023 • **Maize Genetic Cooperation Member**
- 2023 • **Workshop Creator; Preparing for Interviews: Behavioral, Technical, and Job Search Preparation, Internal professional development workshop**
- 2023 • **Panel Member, Non-academic research careers, MU Summer Undergraduate Research Program: Professional Dev. Mini-Conference**
- 2023 • **Panel Member, Working with your Mentor, MU Summer Undergraduate Research Program: Summer Intern Orientation**
- 2022 • **Workshop Assistant; Data Management with SQL**  
University of Missouri, Columbia  
• Data Management with SQL
- 2022 • **Workshop Instructor; R for Reproducible Scientific Analysis**  
University of Missouri, Columbia
- 2022 • **Workshop Creator; Tools and Techniques for a Jupyter Based Scientific Workflow**  
Created and delivered a workshop on data visualization in Python for University of Missouri [Bioinformatics in Plant Science](#)

2022

- **Software Carpentries Certified Instructor**

Received theoretical and practical instruction on leading computational workshops. Taught [R for Reproducible Scientific Analysis](#), assisted in teaching [Data Management with SQL](#).

2022

- **Panel Member, Next-Generation Omics, Biological Sciences Divisional Retreat**

Ruthie Angelovici, *David J Schulz*, Daniel R Kick, and Mannie Liscum, University of Missouri Division of Biological Sciences Retreat

2019

- **Society for Neuroscience Member**

| 2016

2017

- **Workshop Assistant; Computational Neuroscience: Models and Neurobiology (NIH BRAIN Initiative Short Course)**

| 2016

2016

- **Scientific Poster Judge**

Spring Undergraduate Research and Creative Achievements Forum

## MENTORING

2023

- **Madi Michell**

| 2022

· University of Missouri Student Researcher

2023

- **Grace Sidberry**

| 2021

· University of Missouri Student Researcher

2019

- **Abby Beckerdite**

| 2016

· University of Missouri Student Researcher

2019

- **Ayla Ross**

· NSF Research Experience for Undergraduates Student

2018

- **Katlyn Sullivan**

· NSF Research Experience for Undergraduates Student

2017

- **Kelly Hiersche**

· NSF Research Experience for Undergraduates Student

2016

- **Rody Kingston**

· Postbaccalaureate Research Student

## PROFESSIONAL DEVELOPMENT

2024

- **MaizeGDB: Pan-genome and AI resources, Maize Genetics Cooperation**

2024

- **Gramene Workshop, Maize Genetics Cooperation**

- 2023 Applications of AlphaFold2 for Studying Proteins, University of Missouri
- 2023 APSIM Training Course, Iowa State University
- 2022 MU-Bayer Mentoring Program (mentee)
- 2020 Software Carpentry: Python, University of Missouri
- 2017 Diversity & Inclusion Workshop, University of Missouri
- 2016 Big Data in Biology, University of Austin

## PUBLICATIONS

- 2023 RootBot: High-throughput root stress phenotyping robot  
Mia Ruppel, Sven K. Nelson, Grace Sidberry, Madison Mitchell, Daniel Kick, Shawn K. Thomas, Katherine E. Guill, Melvin J. Oliver, Jacob D. Washburn  Applications in Plant Sciences
- 2023 Yield Prediction Through Integration of Genetic, Environment, and Management Data Through Deep Learning  
Daniel R. Kick, Jason G. 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 P. Singh, Teclemariam Weldekidan, Jacob D. Washburn  G3
- 2023 Ensemble of Best Linear Unbiased Predictor, Machine Learning, and Deep Learning Models Predict Maize Yield Better Than Each Model Alone  
Daniel R. Kick, Jacob D. Washburn  in Silico Plants
- 2022 Timing dependent potentiation and depression of electrical synapses contributes to network stability in the crustacean cardiac ganglion  
Daniel R. Kick and David J. Schulz  The Journal of Neuroscience
- 2019 Molecular profiling of single neurons of known identity in two ganglia from the crab *Cancer borealis*  
Adam J. Northcutt<sup>1</sup>, Daniel R. Kick<sup>1</sup>, Adriane G. Otopalik, Benjamin M. Goetz, Rayna M. Harris, Joseph M. Santin, Hans A. Hofmann, Eve Marder, and David J. Schulz  Proceedings of the National Academy of Sciences
- 2019 Cell Communication: Studying gap junctions with PARIS  
Daniel R. Kick, David J. Schulz  eLife
- 2018 Dopamine maintains network synchrony via direct modulation of gap junctions in the crustacean cardiac ganglion  
Brian J. Lane, Daniel R. Kick, David K. Wilson, Satish S. Nair, David J. Schulz  eLife
- 2018 Motor Systems: Variability in neural networks  
Daniel R. Kick, David J. Schulz  eLife
- 2016 The Hillary Climber trumps manual testing: an automatic system for studying *Drosophila* climbing  
Alex M. Willenbrink, Margo K. Gronauer, Leon F. Toebben, Daniel R. Kick, Madalyn Wells & Bing Zhang  The Journal of Neurogenetics



## PUBLICATIONS IN PREPARATION

2023

- **The Mustard Mayhem: Phylogenetically localizing and dating the mesohexaploidy of the tribe Brassiceae**

Shawn K. Thomas, R. Shawn Abrahams, Nora Walden, Tatiana Arias, Daniel Robert Kick, Alex McAlvay, Alex Harkess, Michael R. McKain, Ihsan A. Al-Shehbaz, Frederic Lens, Kasper Hendriks, Marcus A. Koch, J. Chris Pires, Jacob Washburn

📍 (In Prep)

2023

- **Crustacean cardiac ganglion model reveals constraints on morphology and conductances**

Dan Dopp, Pranit Samarth, Jing Wang, Daniel Kick, David J. Schulz, Satish S. Nair

📍 In Prep, BioRxiv



## NATIONAL PRESENTATIONS

2024

- **Ensembles of deep learning, machine learning, and linear models outperform individual models for maize yield prediction in diverse environments**

Maize Genetics Meeting

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Poster

2023

- **Maize yield prediction accuracy increased by inclusion of genetics, environment, and management interactions with deep learning**

Maize Genetics Meeting

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Presentation

2023

- **Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning**

Plant and Animal Genetics (PAG), San Diego CA

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Poster

2022

- **Improving Maize Yield Prediction through Genetic, Environmental, and Management Factor Interactions with Deep Learning**

ASA, CSSA and SSSA International Annual Meetings, Baltimore MD

- *Daniel R Kick, Jacob D. Washburn (2022)*
- Poster

2022

- **Improving Maize Yield Prediction through Genetic, Environmental, and Management Factor Interactions with Deep Learning**

ASA, CSSA and SSSA International Annual Meetings, Baltimore MD

- *Daniel R Kick, Jacob D. Washburn (2022)*
- Presentation

2022

- **Yield Prediction Accuracy is Improved Through Incorporating Genetic, Environmental, and Management Interactions with Deep Learning,**

University of Missouri Interdisciplinary Plant Group Symposium, Columbia MO

- *Daniel R Kick, Jacob D. Washburn (2022)*
- Presentation

2020

- **Effects of blockade of K<sup>+</sup> currents on membrane conductance and channel expression at 1 hour and 24 hours in motor neurons of the cardiac ganglion.**

Dynamic Neural Networks: The Stomatogastric Nervous System, Virtual

- *Daniel R Kick, Brian J. Lane, David J Schulz.*
- Presentation

2019

● **Loss of synchronous activity across gap junctions results in a phase-dependent change in coupling conductance magnitude.**

Neuroscience, Chicago IL

- *Daniel R Kick, David J Schulz.*
- Poster

2019

● **Asynchronous voltage activity regulates electrical synapse plasticity.**

Dynamic Neural Networks: The Stomatogastric Nervous System, Chicago IL

- *Daniel R Kick, David J Schulz.*
- Presentation

2017

● **Variability from mRNAs to network output in the *C. borealis* cardiac ganglion.**

Dynamic Neural Networks: The Stomatogastric Nervous System, Washington D.C

- *Daniel R Kick, David J Schulz.*
- Presentation

2017

● **Variation across network output, excitatory post synaptic potentials, ionic conductances, and ion channel and receptor mRNAs within motor neurons of the crustacean cardiac ganglion.**

Neuroscience, Washington D.C.

- *Daniel R Kick, Brian J Lane, Joseph L Ransdell, Satish S Nair, David J Schulz.*
- Poster

2016

● **What crustaceans can teach us about the workings of the nervous system.**

Animal Behavior Society, Columbia MO

- *Virginia Garcia, Daniel R Kick, Cindy Kyi, Brian J Lane, Kwasi M Lett, Adam J Northcutt, Joseph L Ransdell, Simone Temporal, and David J Schulz.*
- Poster



## LOCAL PRESENTATIONS

2024

● **Using AI and ensembling methods to improve plant yield predictions across diverse environments**

University of Georgia, AI in Plant Breeding Symposium, Athens GA

- *Daniel Kick*
- Presentation

2024

● **The Promises and Pitfalls of Deep Learning Methods for Plant Phenotype Prediction**

Iowa State University Department of Agronomy Plant Breeding Seminar, Invited Seminar, Ames IA

- *Jacob Washburn and Daniel Kick*
- Presentation

2024

● **The Quick and Easy Way to Predict Phenotypes More Accurately**

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Presentation

2024

● **Ensembles of deep learning, machine learning, and linear models outperform individual models for maize yield prediction in diverse environments**

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick, Jacob D. Washburn (2023)*
- Poster

2024

● **Greater than the Sum of Its Parts: Better Phenotypic Prediction across Environments by Combining Deep Learning and Statistical Models**

Truman State University Biology Department Invited Seminar, Kirksville MO

- *Daniel R Kick* and Jacob D Washburn
- Presentation

2024

● **The Promises and Pitfalls of Deep Learning Methods for Plant Phenotype Prediction**

Michigan State University Department of Epidemiology and Biostatistics Invited Seminar, East Lansing MI

- *Jacob Washburn* and *Daniel Kick*
- Presentation

2024

● **Environmentally Aware Deep Learning: Overcoming Gene by Environment Effects and Enhancing Biological Interpretability**

University of Missouri DBL Group Meeting, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Presentation

2023

● **Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning**

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Poster

2022

● **Maize Yield Prediction is Improved by Modeling Interactions between Genetic, Environmental, and Management Factors with Deep Learning**

Interdisciplinary Plant Group Seminar “Plant Talks”, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Presentation

2022

● **Yield Prediction Through Integration of Genetic, Environment, and Management Data by Deep Learning**

University of Missouri MU Plant Research Symposium, Columbia MO

- *Daniel R Kick*, Jacob D Washburn
- Poster
- Ranked first in poster competition

2019

● **Classifying neurons from molecular data**

University of Missouri [DataPhiles](#), Columbia MO

- *Daniel R Kick*, David J Schulz
- Presentation

2018

● **Voltage Dependent Modification of Electrical Synapses and Ionic Conductances**

University of Missouri-Columbia Life Sciences Week, Columbia MO

- *Daniel R Kick*, David J Schulz
- Poster

2017

● **The Cancer borealis Cardiac Ganglion: a Window into Variability and Activity Dependent Regulation**

NIH-T32 progress seminar, Columbia MO

- *Daniel R Kick*, David J Schulz
- Presentation

2015

**Upregulation of the Minor Spliceosome in Mouse Retinae due to Zaprinast Exposure**

Truman State University Student Research Conference, Kirksville MO

- *Daniel R Kick, Marybeth Baumgartner, Christopher Lemoine, Devi Krishna Priya Karunakaran, Nikita Sturrock, Amye Black, Rahul Kanadia*
- Poster

2014

**Upregulation of the Minor Spliceosome in Mouse Retinae due to Zaprinast Exposure**

University of Connecticut Summer Undergraduate Research Conference, Storrs CT

- *Daniel R Kick, Marybeth Baumgartner, Christopher Lemoine, Devi Krishna Priya Karunakaran, Nikita Sturrock, Amye Black, Rahul Kanadia*
- Poster

2013

**Effective Gene Therapy in Spinal Muscular Atrophy: Utilizing Antisense Oligonucleotides Targeting Intronic Repressor Elements**

University of Missouri Summer Undergraduate Research Conference, Columbia MO

- *Daniel R Kick, Eric Osman, Christian Lorson*
- Poster

## OUTREACH AND OTHER PRESENTATIONS

2023

**Rootbot, Rover, Drones, and Deep Learning**

University of Missouri Biology DataBlitz, Columbia MO

- *Daniel R Kick, Shawn Thomas*
- Presentation

2023

**Maize Yield Prediction Accuracy Increased By Inclusion of Genetics, Environment, and Management Interactions With Deep Learning**

University of Missouri Graduate Student Recruitment, Columbia MO

- *Daniel R Kick, Jacob D. Washburn*
- Poster

2022

**Maize Yield Prediction is Improved by using Deep Learning to Incorporate Interactions between Genetic, Environmental, and Management Factors.**

USDA-ARS AgriCulture Series, Virtual

- *Daniel R Kick, Jacob D Washburn*

2022

**From Neurobiologist to Research Geneticist**

Beyond the PhD (beyond-the-phd.com), Virtual

- *Daniel R Kick*
- Presentation

2019

**Spare the synapse, spoil the circuit, Public presentation**

Science on Tap, Columbia MO

- *Daniel R Kick*
- Presentation

2019

**Can mRNA expression recapitulate neuron cell types**

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2019

• **Voltage Dependent modification of Electrical Synapses**

University of Missouri Biological Sciences Recruitment, Columbia MO

- *Daniel R Kick*
- Poster

2018

• **Gap Junction Conductance Modulation Via Voltage**

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2017

• **Please mind the gap: Network homeostatic plasticity in the Cancer borealis cardiac ganglion**

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation

2016

• **The Tell-Tale Heart: Applying crustacean neurogenic hearts to basic neurosciences questions**

Truman State University Alumni Research Presentation, Kirksville MO

- *Daniel R Kick*
- Presentation