CURRICULUM VITAE

W. Zane Billings

Contact Information:

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Education:

2020 B.S., Biology and Mathematics, Western Carolina University. 4.0 GPA.

Research:

PI: Heather Coan, Western Carolina University. Spring 2016 - Present

- Examined the ability of keratin to modulate the autophagy pathway in human cells.
- Maintained HEK-293 cultures for the lab group, and prepared cultures for experiments.
- Optimized transfection into HEK cells of a dual-reporter autophagy biomarker plasmid.
- Visualized changes in the autophagy pathway using wide-field epifluorescence microscopy.
- Compiled and analyzed data using FIJI and `R`.

PI: Andreas Handel, University of Georgia. Summer 2019

- Participant in the 2019 REU site Population Biology of Infectious Diseases at the University of Georgia, and was funded by the NIH.
- Cleaned and joined a complex relational data set from a 2016–2017 study at the University of Georgia student health center.
- Analyzed the impact of viral load estimates from qPCR data on clinical prognoses and treatment of influenza A.
- Modeled and visualized the relationships between several variables using `R`, and presented results using `R`-Markdown.

PI: Louis-Marie Bobay, UNC Greensboro. Summer 2018

- Participant in the 2018 REU site Math-Biology at the University of North Carolina at Greensboro, and was funded by the NSF.
- Constructed a probabilistic model for determining the probability of n number of convergent mutations between two bacterial genomes.
- Verified the accuracy of the model using Monte-Carlo simulation methods in `Python`.
- Visualized model predictions, effects of parameters, and simulation results in `R`.

PI: William Kwochka, Western Carolina University Fall 2017 - Spring 2018

- Synthesized complex organic products, namely phenylboronic acid derivatives and Lewis acid-base complexes.
- Analyzed the properties of these complexes for rotation activity, in the hopes that we would discover an effective molecular rotor.
- Confirmed identity of samples using H-NMR, C-NMR, H-H homonuclear COSY, IR, and GC/MS methods.

PI: Jeremy Hyman, Western Carolina University. Summer 2016

- Participant in WCU's Summer Undergraduate Research Program in 2016 for incoming freshman, and was funded by WCU.
- Observed aggressive behaviors of urban vs. rural song sparrows (*Melospiza melodia*).
- Performed song playback experiments to quantify aggressive song sparrow behavior in the field.

OEIS Contributions

- Author of sequence A319302.
- Wrote Python code and generated a b-file for sequence A110529.

Awards:

- Meritorious Winner, COMAP Mathematical Contest in Modeling, 2019.
- WCU Distinguished Achivement Scholarship, 2016 – 2020.
- Stacy O'Connell Scholarship and research grant, 2018–19 and 2019–2020.
- Chancellor's List, every semester.

Coursework:

- Biology: Advanced Techniques in Microscopy, Cell Biology, Evolutionary Biology, Molecular Immunology, Origin of Species, Protein Systems Bioinformatics.
- Math: Linear Algebra, Linear Optimization, Mathematical Modeling, Ordinary Differential Equations, Probability, Scientific Computing, Statistical Methods (one year).

Skills:

- RCR certified (CITI Program)
- Proficient with `R`.
- Experienced with Python, `MATLAB`, and Mathematica.
- Experienced with Git and the MacOS terminal.
- Familiar with LaTeX, Markdown, HTML, and CSS.
- Mammalian cell culture and fluorescence microscopy.