

Carson Stacy

Cell and Molecular Biology and Data Science

email: clstacy@uark.edu | github: clstacy | twitter: carsonlstacy

Currently

I'm studying at the intersection of Cell and Molecular Biology and Statistics at the University of Arkansas. I'm currently developing quantitative techniques and an integrative workflow for quantifying virulence of host-virus interactions across domains of life. My work involves a synergy of techniques including agent and constraint based modeling of infection, Bayesian (Gaussian Process Regression) and Machine Learning techniques to quantify, classify, and predict effects of virus-host interactions.

Employment

Since 2020 *Graduate Research Assistant for the Ceballos Research Lab* (Fayetteville, AR. United States).

* Researching novel approaches for quantifying host-virus interactions of non-lytic viruses.

- I analyze virus-induced temporal phenotypic changes of the host to quantify virulence.
- Co-authored two papers introducing and applying techniques for differentiation virus-induced growth changes.
- Gaussian process modeling techniques, MLP Classifiers, convolutional and recurrent neural networks, dynamic flux-balance analysis of stressed systems and agent-based simulation techniques

2019-2020 *Laboratory Technician for the Ceballos Research Lab* (Fayetteville, AR. United States).

- Operated state-of-the-art Fast Protein Liquid Chromatography (FPLC) machine
- Created a SOP for use and maintenance of device including automated buffer making, ion exchange, and size exclusion best-practices.
- Maintained lab supplies and handled ordering for the lab. I implemented a proof-of-concept neuron tracing and counting algorithm to be used by a PhD student.
- Used the software Geneious for primer design, phylogenetic analysis of novel genomes to assist graduate and undergraduate research projects in the lab.
- Used protein databank tools and molecular dynamics protein modeling tools to predict sub-unit interactions of engineered protein complex.

2019 (6 months) *Athletic Tutor for University of Arkansas Athletics Program* (Fayetteville, AR. United States).

- Lead individual and small group tutoring sessions for General and Organic Chemistry I and II, Biochemistry I, Biochemistry II, Introduction to Biochemistry, Principles of Biology, Anatomy and Physiology, Calculus I, and Principles of Statistics.

2017-2018 *Peace Corps Volunteer High School Chemistry Teacher* (Kolahun, Lofa County. Liberia).

- Worked as first and only chemistry teacher in only high school in Kolahun district of Liberia since 2004. Designed and led interactive lesson plans for over 1200 students for 2 years (grades 10-12).
- Created exam questions for each grade and compiled a question generator for future use.
- Engaged in capacity building by training other interested science teachers in fundamental chemistry concepts and ways to teach them.
- Provided resources and practice teaching chemistry courses to student teacher in order to continue after my departure.
- Co-lead Girls Club of Kolahun in promotion of gender equity. Introduced indigenous language component to malaria education program at local health clinic.
- Grassroots soccer volunteer and mentor.
- Collaborated with local NGO to train local students to lead age-appropriate critical thinking workshops for children identified as disadvantaged.

2014-2017 *Supplemental Instruction Leader (Chemistry) for CLASS+ at University of Arkansas* (Fayetteville, AR. United States).

- Lead small group drill sessions to promote student success in first year chemistry courses ranging from Fundamentals of Chemistry to Honors Chemistry II.
- Designed and facilitated interactive lesson plans.
- Served as an SI leader mentor advising and co-leading yearly trainings for SI leaders on campus.
- Focused on increasing interactivity in lessons and promoting gender equitable teaching approaches.

Education

Since 2020 *PhD in Cell and Molecular Biology at the University of Arkansas* (Fayetteville, AR. United States).

- Distinguished Doctoral Fellow

Since 2020 *MS in Statistics and Analytics at the University of Arkansas* (Fayetteville, AR. United States).

- Concentration in Statistics

2013-2017 *BS in Anthropology at the University of Arkansas* (Fayetteville, AR. United States).

- Honors College Graduate
- GPA: 4.0

Honors and Awards

2021 - **Ford Foundation Predoctoral Fellow Honorable Mention**

2019 - **Distinguished Doctoral Fellow** at the University of Arkansas

2017 - **Phi Beta Kappa Honor Society Member**

2015 - **Alpha Epsilon Delta Honor Society Volunteer Coordinator**

Publications

- 2021** Ceballos, R. M., & **Stacy, C. L.** (2021). Quantifying relative virulence: when mumax fails and AUC alone just is not enough. *Journal of General Virology*, 102(1), 001515.
- 2020** Ceballos, R. M., Drummond, C. G., **Stacy, C. L.**, Padilla-Crespo, E., & Stedman, K. M. (2020). Host-dependent differences in replication strategy of the *Sulfolobus* spindle-shaped virus strain SSV9 (aka, SSVK1): infection profiles in hosts of the family Sulfolobaceae. *Frontiers in microbiology*, 11, 1218.

Presentations

- 2020** Analytical Approaches for Characterizing Relative Virulence in Non-Lytic Viral Systems: Using *Sulfolobus* Spindle-shaped Viruses (SSVs) to Illustrate the Utility of Parametric Gompertzian and Non-Parametric Gaussian Regression Models. **Carson L. Stacy** and Ruben M. Ceballos. Annual Meeting of the Microbiology Society 2020. (Edinburgh, Scotland, UK) [poster accepted and abstract published; meeting cancelled due to the COVID-19 pandemic]
- 2015** Effect of Lifestyle Physical Activity and Western Diet on Genes Controlling Mitochondrial Translation. **Carson L. Stacy**, David E. Lee, Jacob L. Brown, Megan E. Rosa, Jordyn N. Henry, Lemuel A. Brown, Richard A. Perry, Jr., Tyrone A. Washington, Nicholas P. Greene. Central States ACSM Regional Meeting 2015, International Journal of Exercise Science Conference Proceedings.

Open Source Contributions

- R package for Weighted Spectral Difference calculation on Far UV Circular Dichroism data across temperature gradients
 - <https://github.com/clstacy/WeightedSpectralDifference>

Technical Skills

- R
- Julia
- Python
- TensorFlow
- sklearn
- MATLAB
- Stan
- RegEx
- COBRA (Flux Balance Analysis package, not the discontinued programming language)

Areas of Expertise

- Data Visualization
- Statistics
- Bayesian Regression
- Machine Learning
- Biological Simulation
- Time Series Analysis
- Experimental Design

clstacy@uark.edu • +479-238-3926 • 25 years old
Fayetteville, AR