**Lucas J. Carbajal**

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**EDUCATION**

**University of Miami**, Coral Gables, FL

Baccalaureate of Science 2020-2024

***Major:*** *Biology (Major GPA: 4.0/ Cumulative GPA: 3.86)*

***Minors:*** *Mathematics (Minor GPA: 3.9), Biophysics (Minor GPA: 4.0)*

***Scholarships:*** Canes Achievement Award, Mildred Lunas Bain Memorial Scholarship, Priscilla J. Schneller Memorial Scholarship, CV Starr Scholarship

***Awards/Honors****:* Dean’s List, Provost’s Honor Roll, President’s List, Mycological Society of America SPORES Program Recipient, Phi Beta Kappa

***Relevant Courses:*** Biophysics, Organic Chemistry, Cellular & Molecular Biology, Genetics, Molecular Genetics Lab, Ecology & Lab, Comparative Physiology, Probability & Statistics, Ordinary Differential Equations, Linear Algebra, Microbiology & Immunology Lab

**LABORATORY & WORK POSITIONS**

**Research Associate I,** Luque Physical Virology Lab

*University of Miami* Summer 2024-Present

* Constructed independent pipeline to explore theoretical framework to analyze inputted models based on set observational principles.
* Collaborated on a manuscript in preparation, generating data sets, conducting analysis, and creating a majority share of figures within the pre-printed text.
* Coordinated strategic handling of shared files and managing of day-to-day logistics to meet internal goals.

**Undergraduate Laboratory Assistant,** Afkhami Ecology-Evolution-Genomics Lab

*University of Miami*  Spring 2022-May 2024

* Cultured fungi and bacteria, quantified colony growth, and used aseptic technique and spectroscopy to standardize plant-symbiote-pathogen systems.
* Measured and recorded weekly growth and health of 1050 M. truncatula samples, including periodic morphology assessments.
* Extracted RNA and soil DNA, modified protocols for research system, and developed a contamination prevention tool.

**Undergraduate Research Assistant,** Winter Beckles’ Evolutionary Ecology Research

*University of Miami*  Fall 2022-May 2024

* Collected environmental data on anoles in urban Miami and constructed spectral graphs using RStudio.
* Proposed behavioral catalogs for invasive species interactions and worked under IACUC guidelines to analyze research processes.

**Laboratory Assistant to Introductory Biology Labs, Biology Department**

*University of Miami* August 2021-May 2024

* Maintained inventory of materials for undergraduate teaching labs and prepared experiments by procuring live specimens, mixing chemicals, acquiring lab materials, and troubleshooting errors with teaching assistants.
* Collaborated with a lecturer to create accessible working environments for new hires and standardized experimental protocols.

**SKILLS**

* **Data Analysis and Modeling:** Proficient in MATLAB, R, and Python for data manipulation, statistical analysis, modeling, and visualization.
* **Laboratory Techniques:** Skilled in microscopy (compound, dissecting), chromatography (column, gas), and aseptic techniques for biological research. Experienced in DNA and RNA extraction, PCR, gel electrophoresis, and transformation.
* **Behavioral Analysis:** Effective in generation of behavioral catalogs, monitoring subjects, and collecting behavioral data.

**RESEARCH CONTRIBUTIONS**

PUBLICATIONS:

Cobo-Lopez S, Witt M, **Carbajal LJ,** Rohwer FL, and Luque A. Emerging dynamic regimes and tipping points from finite empirical principles. (Published pre-print in *bioRxiv* | doi: https://doi.org/10.1101/2023.12.27.573307)

* Developed and deployed a novel automated pipeline to analyze inputted lytic Lotka-Volterra phage-bacteria models to be analyzed and have dynamics characterized based on finite observational principles.
* Created additional modules to provide error analysis and accessible outputs for user-decided analysis, enhancing end-user experience.
* Prepared majority of published figures on analysis through post-production edits to streamline understanding of framework application.

Rawstern AH, **Carbajal LJ,** Slade T, Afkhami ME. Non-additive interactions between multiple mutualists and host plant genotype simultaneously promote increased plant growth and pathogen defense. (Under Review for *Plant, Cell & Environment*)

* Prepared the variable groups of approximately 1050 *Medicago truncatula* samplesthrough application of aseptic technique and spectroscopy to standardize initial soil microbiome.
* Over one and half year course, recorded weekly growth and physiological markers of *M. truncatula* to monitor health, as well as supervising and training peers to aid in this analysis.
* Prepared tool and modified proposal to low contamination of soil DNA extraction, and conducted subsequent RNA extraction on root structures of samples.

PRESENTATIONS:

*Invited Guest Lecturer: STEM Career Development* (BIL 299) Spring 2025

“Career Journey: From Research Associate to Graduate Student”

* Presented career journey from student volunteer to paid research associate to University of Miami Doctoral program graduate student.
* Shared insights on tools and practices for securing positions in computational or molecular laboratories.
* Emphasized the importance of building networks in science for collaborative success.

*Howard Hughes Medical Institute Research Open Symposium* (BIL153/CHM113) Fall 2020

“Neurological and Physiological Effects of Reactive Oxygen Species on Drosophila Flies”

* Designed and executed experiments on reactive oxygen species (ROS) effects in model biological systems.
* Developed and administered fluorescent dye suspensions to treatment groups over seven weeks.
* Conducted spectral analysis of fluorescent dyes and physiological aptitude screens on Drosophila flies.

*Howard Hughes Medical Institute Research Open Symposium* (BIL163/CHM201) Spring 2021

“The Effects of Green and Black Tea Yeast Pastes On *Drosophila* Survival Upon Exposure to UV Radiation.”

* Designed experiments on antioxidants' impact on longevity and cancerous growths.
* Developed extraction protocols for organic compounds and optimized efficacy through repeat spectral absorption analysis.
* Established Drosophila cultures and conducted longitudinal survival studies post-treatment.