

## Linton Freund

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<https://github.com/hlfreund> | <https://hlfreund.github.io>

## ABOUT

I am a trained bioinformatician with seven years of experience in analyzing a variety of sequence data types. I have worked with iTag (i.e., amplicon) and shotgun metagenome sequence data, and I have also developed workflows in Bash shell and R statistical software that walk users through how to process and analyze their data using bioinformatic tools and statistical analyses, most notably model-based analyses. I am passionate about creating and using an accessible, interdisciplinary approach with bioinformatics and statistics to address important questions about environmental health, public health, and their intersections.

## EDUCATION

### PhD., Genetics, Genomics, & Bioinformatics

August 2024

University of California, Riverside; Riverside, CA

- Dissertation Title: The Taxonomic and Functional Microbial Diversity of Sub-Ecosystems within the Harsh Salton Sea

### MSc., Biology

May 2019

California State University, Long Beach; Long Beach, CA

- Thesis Title: Insights into the Structure and Function of the Gut Metagenome in Cartilaginous Fishes

### As., Biology

May 2017

Moorpark College; Moorpark, CA

### BA., Psychology

June 2014

University of California, Santa Barbara; Santa Barbara, CA

## WORK & RESEARCH EXPERIENCE

### Graduate Student Researcher

Aug 2019 – Present

*Supervisor: Dr. Emma Aronson*

*Microbiology & Plant Pathology Department, University of California, Riverside*

- Designed experiments and lead environmental sample collection efforts at the Salton Sea, CA
- Extract and quantify DNA extracts for amplicon and shotgun metagenome sequencing.
- Process and analyze amplicon and shotgun sequencing metagenomic data with bioinformatic tools, custom Bash shell scripts, and custom workflows using R statistical software and RMarkdown.
- Perform statistical analyses on amplicon sequence data, metagenome sequence data, and geochemistry data using R statistical software packages and custom R scripts.

### Graduate Student Researcher

Aug 2017 – May 2019

*Supervisor: Dr. Renaud Berlemont*

*Microbiology Department, California State University, Long Beach*

- Processed raw (unassembled) metagenome sequence data via bioinformatics tools and custom Bash shell scripts.
- Statistically analyzed raw metagenome sequence data via custom R scripts and R packages.
- Reviewed current research on enzymatic polysaccharide deconstruction by microbes in the gut of vertebrates.
- Assisted Principal Investigator in writing, editing, and reviewing lab publications.

**Contract Biologist****Jun 2016 – Jan 2017***Supervisor: Dr. Jana Johnson**The Butterfly Project, Moorpark College*

- Captured endangered, gravid foundresses and released pupae in the field.
- Performed and supervised feedings of the endangered butterflies.
- Monitored butterfly oviposition and mapped locations of butterfly eggs.
- Built habitats for larvae, pupae, and butterflies respectively and cared for the foliage included in these habitats.

**Student Intern****Feb 2016 – Apr 2016***Supervisor: Dr. Subhash Karkare**Biotechnology Department, Moorpark College*

- Prepared cytotoxic T-lymphocyte associate protein 4 samples for ELISA trials.
- Developed an ELISA protocol to reduce the time of the ELISA for a Moorpark College Biotechnology Certificate course.
- Researched the purpose and technique behind the ELISA for the associated lesson plan.
- Recorded qualitative analysis of ELISA results to include for the ELISA lesson plan & protocol.

**Lead Clinical Research Coordinate****Jun 2014 – Aug 2014***Supervisor: Luna Yojay, PharmD.**LY Pharmacy Inc.*

- Supervised and recorded the administration of trial pharmaceuticals, specifically medications that target chronic kidney disease, to dialysis patients participating in our trials.
- Monitored vital signs of patients after the trial pharmaceuticals were administered.
- Met with Clinical Research Associates to update them on the incoming results from our patients.
- Recorded and managed trial data utilizing the electronic data-capture Medidata Rave.

**Undergraduate Research Assistant****Sep 2013 – Jun 2014***Supervisor: Dr. F. Gregory Ashby**Psychological and Brain Sciences Department, University of California, Santa Barbara*

- Collected and organized data from graduate students' respective experiments using Microsoft Excel.
- Observed and assisted graduate students in data analysis of computer-based experiments using MATLAB.
- Supervised computational-based experiments for graduate students that targeted procedural and declarative learning systems in the prefrontal cortex.
- Designed and conducted an independent research project that focused on how and when the prefrontal cortex switches between procedural verses declarative learning.

**TEACHING EXPERIENCE****Teaching Assistant****Jan 2024 – Present***Introduction to Cell and Molecular Biology, BIOL 005A**Supervisor: Dr. David Fronk**Microbiology & Plant Pathology Department, University of California, Riverside*

- Reviewed course material with undergraduate students as lectures and as worksheets that were completed in class.
- Worked with fellow teaching assistants, the instructors, and the academic coordinator to create and grade quizzes.

**Teaching Assistant****Apr 2021 – June 2021***Introduction to Microbiology Lab, MCBL 121L**Supervisor: Dr. James Borneman**Microbiology & Plant Pathology Department, University of California, Riverside*

- Lectured on basic microbiology lab techniques and the science behind them, including DNA extraction, DNA purification, and sequencing library amplification using PCR.
- Reviewed and graded lab exams and laboratory notebooks that students used to record their respective experiments and results.

## Teaching Assistant

Feb 2018 – May 2018

*Introduction to Evolution and Diversity Lab, BIOL 211L*

*Supervisor: Lindsay Darjany, MS.*

*Biology Department, California State University, Long Beach*

- Created and presented lectures that covered basic concepts from biology and ecology.
- Led students through in-class lab activities that reinforced the concepts covered in our lab lectures.

## PUBLICATIONS

Aronson, E. L., **Freund, H. L.**, and Maltz, M. R. 2023. Microbiology of the Critical Zone. Critical Zone and Ecosystem Dynamics, White, T. and A. Provenzale, Eds. Springer-Verlag. *in press*.

**Freund, L.** (2023). Amplicon Sequencing Workflow (v1.0.1). Zenodo.

<https://doi.org/10.5281/zenodo.8264886>

Biddle, T.A., Yisrael, K., Drover, R., Li, Q., Maltz, M.R., Topacio, T.M., Yu J., Del Castillo, D., Gonzales, D., **Freund, H.L.**, Swenson, M.P., Shapiro, M.L., Botthoff, J.K., Aronson, E., Cocker, D.R. 3rd, Lo D.D. Aerosolized aqueous dust extracts collected near a drying lake trigger acute neutrophilic pulmonary inflammation reminiscent of microbial innate immune ligands. *Sci Total Environ.* 2023 Feb 1;858(Pt 3):159882. doi: 10.1016/j.scitotenv.2022.159882. Epub 2022 Nov 2. PMID: 36334668.

Maltz, M.R.; Carey, C.J; **Freund, H.L.**; Botthoff, J.; Stajich, J.E.; Hart, S.C.; Aarons S.; Aciego, S.; Blakowski, M.; Cullen Dove, N.D.; Barnes, M; Pombubpa N.; Aronson, E. Landscape topography and regional drought alters dust microbiomes in the Sierra Nevada of California. *Frontiers in Microbiology* 2022 13:856454.

**Freund H.L.**, Maltz M.R., Swenson, M.P., Topacio, T.M., Montellano, V.A., Porter, W., Aronson, E. Microbiome interactions and their ecological implications at the Salton Sea. *California Agriculture* 2022 76: 1.

Jackson, D.; Maltz, M.R.; **Freund, H.L.**; Borneman, J.; Aronson, E. Environment and Diet Influence the Bacterial Microbiome of *Ambigolimax valentianus*, an Invasive Slug in California. *Insects* 2021 12: 7.

Nguyen, S. T. C., **Freund, H. L.**, Kasanjian, J., and Berlemont, R. 2018. Function, distribution, and annotation of characterized cellulases, xylanases, and chitinases from CAZy. *Applied Microbiology and Biotechnology* 102: 4.

## AWARDS

Best Poster Presentation

2023

*Annual Genetics, Genomics, and Bioinformatics Symposium: "Microbial Function and Diversity in a Hypersaline Lake"*

\$100

Dean's Fellowship Fund Award 2023  
*University of California, Riverside, College of Natural Sciences*  
\$6,200

NMDC Champion 2022  
*National Microbiome Data Collaborative*

Workshop Scholarship 2021  
*University of Washington, Summer Institute of Statistical Genetics*  
\$900

Dr. Janet M Boyce Memorial Endowed Scholarship Fund 2021  
*University of California, Riverside, College of Natural Sciences*  
\$2,000

Best Flash-Talk 2020  
*Annual Genetics, Genomics, and Bioinformatics Symposium: "Investigating the Aeolian Microbiome of the Salton Sea"*  
\$50

Chancellor's Distinguished Fellowship 2019  
*University of California, Riverside, College of Natural Sciences*

Dr. Vern Eveland Memorial Award 2018  
*California State University, Long Beach*  
\$2,500

Linda Lee Warren Graham Endowed Scholarship 2018  
*California State University, Long Beach*  
\$2,000

## SELECTED PRESENTATIONS

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**Linton Freund**, Caroline Hung, Talyssa Topacio, Dr. Charlie Diamond, Alyson Fresquez, Dr. Tim Lyons, Dr. Emma Aronson. Microbial Function and Diversity in a Hypersaline Lake. Poster presentation, UC Riverside Genetics, Genomics, and Bioinformatics Annual Symposium. October 2023, Riverside, California.

**Linton Freund**, Caroline Hung, Talyssa Topacio, Dr. Charlie Diamond, Alyson Fresquez, Dr. Tim Lyons, Dr. Emma Aronson. Microbial Function and Diversity in a Hypersaline Lake. Poster presentation, 9th Annual Southern California Microbiome Symposium. September 2023, Riverside, California.

**Linton Freund**, Talyssa Topacio. The Microbial Connection Between Dust & Health in the Salton Sea. Oral presentation, BREATHE Annual Workshop. May 2022, Riverside, California.

**Linton Freund**. Microbiome Interactions within the Sub-Ecosystems of an Extreme Environment. Oral presentation, UC Riverside Genetics, Genomics, and Bioinformatics Annual Symposium. October 2022, Riverside, California.

**Linton Freund.** Investigating the Aeolian Microbiome of the Salton Sea. Flash-talk, UC Riverside Genetics, Genomics, and Bioinformatics Annual Symposium. October 2020, virtual attendance.

## SKILLS & TECHNIQUES

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### Bioinformatics Experience

- Experience using a variety of bioinformatic tools to process and assess the quality of amplicon sequence data and shotgun metagenome sequence data including FastQC, Trimmomatic, Cutadapt, the BBDMap suite, and DADA2.
- Experience assembling, binning, and annotating shotgun metagenome data as well as calculating read coverage using MEGAHIT, MetaSPades, MetaQUAST, BWA-mem, metaBAT2, checkM, Prodigal, KOFamScan, and featureCounts.
- Experience creating custom scripts using Bash shell and awk commands to process, filter, and merge large amplicon and shotgun metagenome datasets.

### Statistical Analysis and Programming

- Experience using statistical techniques to analyze datasets including modeling-based methods (i.e., linear regressions, generalized linear models), ordination methods (i.e., principal components analysis, principal coordinates analysis, redundancy analysis, canonical correspondence analysis), and multivariate and univariate analysis of variance.
- Experience creating scripts and workflows using R statistical software, Bash shell, and GitHub that guide users through how to assess, process, and analyze sequence data and geochemistry data for any research project.
- Experience managing and analyzing large datasets using Bash shell, R statistical software, and high-performance cloud computing clusters at universities.

### Laboratory Skills

- Soil, seawater, and environmental dust sample collections and processing (i.e., vacuum filtration, sieving, etc.) based on the lab's standardized protocols.
- DNA extraction, DNA quantification, DNA purification, and PCR of environmental DNA for various research projects.
- Culturing microorganisms from isolated cultures (liquid and solid) or environmental samples on simple and complex media.

### Other Skills

- Teaching basic coding in R statistical software and Bash shell, as well as guiding undergraduates and research scientists through coding and analytical tutorials.
- Experience in using Microsoft Word, Excel, PowerPoint, Slack, Discord, and GitHub.

## VOLUNTEER & COMMUNITY SERVICE

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**Food Not Bombs**  
Riverside Chapter  
*Member*

**Oct 2023 – Present**

**Queer Graduate Student Association**  
University of California, Riverside  
*President (2022-2023), Vice President (2021-2022), Member (2020 – Present)*

**Sep 2021 – Present**

**UAW 2865**  
*United Auto Workers*

**Sep 2021 – Present**

*Member (2023 – Present), Bargaining Team Representative Alternate (2022), Biosciences Departments Organizer (2021 – 2022)*

**Genetics, Genomics, and Bioinformatics Student Association Oct 2019 – June 2023**

University of California, Riverside

*Vice President (2022-2023), Vice President (2020-2021), Student Representative Alternate (2019 – 2020)*

**Biology Graduate Student Association**

**Aug 2018 – May 2019**

California State University, Long Beach

*Board Member (2018-2019)*