Linton Freund, PhD

805-444-2337 | lintonfreund@gmail.com | Poway, CA, 92064
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 **Sep 2024**
University of California, Riverside; Riverside, CA
Dissertation Title: The Microbial Ecology of the Salton Sea: How an Extreme Environment Selects for Microbial Metabolism & Survival

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 – Sep 2024**
Supervisor: Dr. Emma Aronson
Microbiology & Plant Pathology Department, University of California, Riverside

- Led and designed experiments investigating the Salton Sea microbial community and microbial biogeochemical cycling using a multidisciplinary, collaborative approach.
- 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 such as MG-RAST and custom Bash shell scripts.
- Statistically analyzed raw metagenome sequence data via custom R scripts and R packages.
- Investigated microbial, enzymatic polysaccharide deconstruction in the gut of vertebrates.
- Assisted Principal Investigator in writing, editing, and reviewing lab publications such as literature reviews and bioinformatics workflows.

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 troubleshooting the Biotechnology Department's enzyme-linked immunosorbent assay (i.e., ELISA) protocol.
- 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
- Designed and conducted an independent research project that focused on how and when the prefrontal cortex swithces between procedural verses declarative learning.
- Collected and organized data from graduate students' respective experiments.
- 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.

TEACHING EXPERIENCE

Teaching Assistant **Jan 2024 – Mar 2024**
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

Dissertation Completion Fellowship Award — 2024
University of California, Riverside
$10,000

Dr. Mir S. Mulla & Leila Mulla Endowed Scholarship Fund — 2024
University of California, Riverside, College of Natural Sciences
$12,000

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

Linton Freund, Talyssa Topacio, Dr. Yaning Miao, Will Porter, Mark Swenson, Dr. Mia Maltz, Jon Bothoff, Dr. Emma Aronson. The Core Aeolian Microbiome and its Pathogenic Potential. Poster Presentation, Beyond the Haze: A Symposium on Dust Impacts on Climate, the Environment and Human Health. May 2024, Davis, 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, Center for Microbiome Innovation International Microbiome Meeting. March 2024, La Jolla, 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

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 BBMap 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.
- Experience creating reproducible and accessible workflows that utilize a variety of bioinformatics tools using Rmarkdown and version control on GitHub, with associated releases on Zenodo.

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 analytical workflows using R statistical software and Bash shell that guide users through how to 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

UC Riverside Graduates for a Free Palestine **Oct 2023 – Sep 2024**
University of California, Riverside
Member, Co-Founder

Food Not Bombs **Oct 2023 – May 2024**
Riverside, CA Chapter
Member

Queer Graduate Student Association **Sep 2021 – Sep 2024**
University of California, Riverside
President (2022-2023), Vice President (2021-2022), Member (2020 – Present)

UAW 4811 **Sep 2021 – Present**
United Auto Workers
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)

REFERENCES

Dr. Emma Aronson
Professor, Microbiology & Plant Pathology Department
University of California, Riverside

(951) 827 - 4201
emma.aronson@ucr.edu
Relationship: Dissertation project supervisor

Dr. Will Porter
Professor, Environmental Sciences Department
University of California, Riverside
(951) 827 - 1387
william.porter@ucr.edu
Relationship: Dissertation committee member, collaborator

Dr. David Lo
Professor, Biomedical Sciences Department
University of California, Riverside
(951) 827 - 4553
david.lo@ucr.edu
Relationship: Collaborator

Dr. Jason Stajich
Professor, Microbiology and Plant Pathology Department
(951) 827 - 2363
jason.stajich@ucr.edu
Relationship: Dissertation committee member