Giordan Kitts | Curriculum Vitae

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Education

University of California, Santa Cruz   **Santa Cruz, CA**
Ph.D. - Microbiology and Environmental Toxicology   *September 2018 - June 2025*

University of California, Santa Cruz   **Santa Cruz, CA**
B.S. - Biochemistry and Molecular Biology, Minor - Bioinformatics   *2012 - 2017*

Research Experience

Yildiz Lab, UCSC   **Santa Cruz, CA**
Graduate researcher; Advisor: Dr. Fitnat Yildiz   *September 2018 - June 2025*

My research focuses on understanding of human pathogen *Vibrio cholerae*'s infection cycle and how this pathogen senses and adapts to environmental insults. My goal is to understand transcriptional network circuitries enable *V. cholerae* environmental adaptation programs. I study mechanisms of activation of two-component signal transduction systems that regulate virulence and biofilm formation in *V. cholerae*. I also develop tools to develop a predictive model using deep learning methods utilizing transcriptional profiling data sets. My project is interdisciplinary and integration of molecular genetics, functional genomics approaches will enhance understanding of *V. cholerae*'s transcriptional landscape.

Associated publication: https://doi.org/10.1371/journal.ppat.1011415

Yildiz Lab, UCSC   **Santa Cruz, CA**
Junior Research Specialist   *April 2017 - September 2018*

Characterized the conserved regulatory circuit, LapDG, controlling reversible cell attachment in *V. cholerae*. First identified in pseudomonads, this mechanism combines c-di-GMP-mediated transcription of an adhesin with post-translational proteolytic control of adhesin cell surface display by second messenger levels. Continued to develop genetic tools and use in screens to identify novel methods of c-di-GMP regulation and modulation. Identified signals and corresponding signal transduction pathways regulating biofilm formation.

Associated publication: https://doi.org/10.1128/mBio.02822-19

Yildiz Lab, UCSC   **Santa Cruz, CA**
Undergraduate researcher; Advisor: Dr. Fitnat Yildiz   *April 2016 - March 2017*

Worked on project entitled "Identification of regulators of c-di-GMP responsible for increased biofilm formation in the absence of flagellum", supervised by Dr. David Zamorano-Sanchez. Identified a previously uncharacterized diguanylate cyclase (CdgO) contributing to modulation of c-di-GMP levels seen in absence of flagellum (termed FDBR - Flagellar Dependent Biofilm Response). Project used forward genetics to identify novel regulators of c-di-GMP, a second messenger molecule ubiquitously correlated to biofilm formation in bacteria, by use of a dual-fluorescent c-di-GMP biosensor coupled with transposon mutagenesis.

Associated publication: https://doi.org/10.1371/journal.pgen.1008703

UCSC iGEM 2016   **Santa Cruz, CA**
Head of metabolic engineering; Advisor: Dr. David Bernick   *Summer 2016*

Partook in the synthetic biology competition International Genetically Engineered Machine (iGEM), as part of the UCSC 2016 team. Team's goal was to create a mutual solution to the crises of excessive agricultural waste and rising obesity rates by engineering a strain of *B. subtilis* to produce the non-caloric alternative sweetener, erythritol, via degradation of an agricultural waste product, almond hulls. Engineered strain was used in a team-created chemostat system leading into a filtration unit, yielding erythritol as end product. As head of metabolic engineering, led team in charge of molecular cloning, necessary genetic manipulation of organism, and optimization of various growth conditions.

Website: https://2016.igem.org/Team:UCSC

Wang Lab, CNCS, HPU   **Kailua, HI**
Research internship   *Summer 2015*

Studied the neuroplasticity associated protein ARC (activity-regulated cytoskeleton-associated protein). Research focused on identifying active site of this protein, and better understanding possible interactions with the protein Dynamin.

Teaching Experience

Advanced Bacteriology Lab   **UCSC**
Instructor of Record   *Spring 2025*

Developed and taught an advanced, research-intensive bacteriology laboratory course for UCSC microbiology majors that integrated microbial genetics, antibiotic-resistance mechanisms, and plasmid stability. Students gained hands-on experience with a broad range of molecular methods—such as whole-genome sequencing, transposon mutagenesis, directed evolution, plasmid-stability assays, and bioinformatics. Each student conducted an independent research project that uncovered novel genetic determinants of antibiotic resistance and plasmid maintenance. The curriculum emphasized rigorous experimental design and data analysis/interpretation. This course effectively prepared participants for graduate-level research and careers in microbiology.

Microbiology Teaching Lab   **UCSC**
Teaching Assistant   *Multiple Academic Quarters*

Led an undergraduate microbiology teaching lab class. Students learn methods for isolation, cultivation, characterization, and identification of unknown microbes. Taught various standard microbiological techniques: Plate isolation methods, aseptic technique, membrane filtration, gram-staining, 16S rRNA sequencing, PCR, gel electrophoresis, etc.

Microbiology Lecture   **UCSC**
Teaching Assistant   *Multiple Academic Quarters*

Teaching assistant for Intro To Microbiology 5-unit lecture course. Lead discussion sections with applied case studies or lecture material review, graded, and helped proctor exams.

Grants and Awards

ARCS Scholar   **2020**
ARCS Foundation

Publications

Giordan Kitts, Krista M. Giglio, David Zamorano-Sánchez, Jin Hwan Park, Loni Townsley, Richard B. Cooley, Benjamin R. Wucher, Karl E. Klose, Carey D. Nadell, Fitnat H. Yildiz, and Holger Sondermann. A Conserved Regulatory Circuit Controls Large Adhesins in Vibrio cholerae. 10(6):e02822–19.

Giordan Kitts, Andrew Rogers, Jennifer K. Teschler, Jin Hwan Park, Michael A. Trebino, Issac Chaudry, Ivan Erill, and Fitnat H. Yildiz. The Rvv two-component regulatory system regulates biofilm formation and colonization in Vibrio cholerae. 19(5):e1011415.

Benjamin X Wang, Julie Takagi, Abigail McShane, Jin Hwan Park, Kazuhiro Aoki, Catherine Griffin, Jennifer Teschler, Giordan Kitts, Giulietta Minzer, Michael Tiemeyer, Rachel Hevey, Fitnat Yildiz, and Katharina Ribbeck. Host-derived O-glycans inhibit toxigenic conversion by a virulence-encoding phage in Vibrio cholerae. 42(3):e111562.

Patrick J. Woida, Giordan Kitts, Stephanie Shee, Adam Godzik, and Karla J. F. Satchell. Actin Cross-Linking Effector Domain of the *Vibrio vulnificus* F-Type MARTX Toxin Dominates Disease Progression During Intestinal Infection. 90(4):e00627–21.

Daniel C. Wu, David Zamorano-Sánchez, Fernando A. Pagliai, Jin Hwan Park, Kyle A. Floyd, Calvin K. Lee, Giordan Kitts, Christopher B. Rose, Eric M. Bilotta, Gerard C. L. Wong, and Fitnat H. Yildiz. Reciprocal c-di-GMP signaling: Incomplete flagellum biogenesis triggers c-di-GMP signaling pathways that promote biofilm formation. 16(3):e1008703.

Posters and Presentations

GRC Sensory Transduction in Microorganisms   **Poster**
Four Points Sheraton, Ventura, CA   *January, 2022*
Title: Characterization of a novel regulator of *Vibrio cholerae* biofilm formation and virulence.

Graduate Recruitment Symposium   **Poster**
Seymour Center, Santa Cruz, CA   *January, 2020*
Title: A conserved regulatory circuit controls large cell surface adhesins in *Vibrio cholerae*.

ASM Microbe 2019 - American Society for Microbiology   **Poster**
Moscone Convention Center, San Francisco, CA   *June, 2019*
Title: A conserved regulatory circuit controls large cell surface adhesins in *Vibrio cholerae*.

BAMPS 2017 - Bay Area Microbial Pathogenesis Symposium   **Poster**
Genentech Hall - UCSF, San Francisco, CA   *March, 2017*
Title: Designing genetic tools to study c-di-GMP in *Vibrio cholerae*.

Skills

- **Code and Software:** R, Python, Command-line (CLI), Markdown, GitHub, LaTeX, Microsoft Office, FIJI, COMSTAT, BiofilmQ, Imaris, Adobe Illustrator, Adobe Photoshop, Inkscape, CytoScape, Obsidian, Notion, Pandoc, Conda/Mamba

- **Bioinformatic tools and databases:** Salmon, DESeq2, Jalview, Bowtie2, SAMtools, BEDtools, UCSC Genome Browser, BLAT, BLAST, NCBI, MicrobesOnline, KEGG, BioCyc, PATRIC, Benchling, Geneious, CLC Genomics Workbench

- **Molecular biology and microbiology:** RNA isolation/clean-up, cDNA library preparation, qPCR, Western blot, Cloning and plasmid design (various methods), bacterial genetics and genome manipulation, biofilm formation, forward genetic screens, transposon mutagenesis, Illumina

library preparation, luminescent/fluorescent reporter assays, Bacterial Two-Hybrid, PCR, media preparations, biosensor generation/optimization, microfluidic flow-cells

- o **Microscopy:** Confocal Laser Scanning Microscopy (CLSM), fluorescence microscopy, phase-contrast, brightfield, fluorescently-tagged protein localization, bacterial staining (Live-Dead, membrane-dyes, Gram-stain)
- o **Data analysis and visualization:** High-dimensional dataset analysis (transcriptomic / metabolomic / proteomic / genomic - i.e. PCA, clustering and heatmap visualization, gene-set-enrichment analysis, etc), RNA-seq, single-cell-RNAseq, variant calling, plate-reader data and growth/survival/reporter curves, quantitative image analysis, statistical learning and modeling, sequence QC and alignment

References

Dr. Fitnat Yildiz   **fyildiz@ucsc.edu**
Principal investigator, Yildiz Lab, UCSC   *408-396-0133*

Dr. Karen Ottemann   **ottemann@ucsc.edu**
Principal investigator, Ottemann Lab, UCSC

Dr. David Bernick   **dbernick@soe.ucsc.edu**
Principal investigator, iGEM Team, UCSC