

Marisol G Fermin Flores

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Los Angeles, CA

EDUCATION

Doctor of Philosophy (P.h.D) Student

2024 - Present

Integrative and Evolution Biology

Research Advisor: Michael Campbell, PhD

University of Southern California

Master of Science (M.S.)

2022 - 2024

Biology: Concentration in Cell and Molecular

Research Advisor: Pleuni Pennings, PhD

Genentech Foundation MS Scholar

San Francisco State University

Bachelor of Science (B.S.)

2018 - 2022

Natural Science | Interdisciplinary Science: Biology

Research Advisor: Yixian Wang, PhD

California State University of Los Angeles

PUBLICATION

- (1) Feng, C.; **Flores, M.**; Dhoj, C.; Garcia, A.; Belleca, S.; Abbas, D. A.; Parres-Gold, J.; Anguiano, A.; Porter, E.; Wang, Y. Observation of α -Synuclein Preformed Fibrils Interacting with SH-SY5Y Neuroblastoma Cell Membranes Using Scanning Ion Conductance Microscopy. *ACS Chem. Neurosci.* **2022**, *13* (24), 3547–3553. <https://doi.org/10.1021/acscchemneuro.2c00478>.

RESEARCH EXPERIENCE

Master Researcher

2022 - 2024

San Francisco State University | Department of Biology

Genentech Scholar | P.I.: Pleuni Pennings, PhD

Thesis Title: Phylogenetic Approach to Understand the Evolution of Antibiotic Resistance in Mycobacterium Tuberculosis

The increase of antibiotic resistant tuberculosis TB can lead to adverse health outcomes. The goal of this study is to use a previously established approach, to (1) create a phylogenetic model from publicly available genome sequences (Ektefaie et al. 2021) dataset (2) to analyze and identify phylogenetic clusters of the antibiotic resistant strains and (3) to analyze transmission and de novo evolution by comparing cluster size to different antibiotics. We expect to be able to identify mechanisms of antibiotic resistance in Mycobacterium Tuberculosis, Mtb. Understanding Mtb antibiotic resistance in tuberculosis can have a significant impact on patients, as we might be able to provide personalized medicine and improve health outcomes, and uncover ways to mitigate rates of resistance and the transmission of resistant Mtb.

Project Title: Antibiotic Resistance and Plasmids.

The publicly available dataset (Kallonen et al. 2017) was used to create phylogenetic trees of bacterial genomes to understand the roles of transmission and de novo evolution of resistance. The dynamics of antibiotic resistance in the clinical population of E coli will be unraveled through understanding the presence of plasmids in cades and phylogroups of different drugs.

Undergraduate Researcher

2020 - 2022

California State University Los Angeles | Department of Chemistry & Biochemistry

P.I.: Yixian Wang, PhD

Project Title: Observation of α -Synuclein Preformed Fibrils Interacting with SH-SY5Y Neuroblastoma Cell Membranes Using Scanning

Ion Conductance Microscopy

Parkinson's disease (PD) is a major health issue that affects the nervous system which hinders body movement. Alpha-synuclein is a protein that can cause development of neurodegenerative disorders such as PD. The goal of the experiment is to have added alpha-synuclein pre-formed fibrils to SH-SY5Y neuroblastoma cell membranes to observe morphological changes through Scanning Ion Conductance Microscopy (SICM) to image in real-time. I've also optimized the cell lives-span to obtain accuracy on cell membrane disruption. I have also been monitoring 1, 5 and 10% PFA fixed cells with pre-formed fibrils. Future plans include making fibrils from alpha-synuclein monomers.

HONORS & AWARDS

Distinguished Achievement Award for Academic Excellence 2024
San Francisco State University

Genentech Foundation MS Scholars Program (Full tuition + Stipend) 2022 - 2024
San Francisco State University
Two year research training fellowship awarded to Master's students from underrepresented groups in science to prepare for careers in the biomedical or physical sciences.

3rd Place at CoSE Student Project Showcase 2023
San Francisco State University

Dean's List Fall 2020; Fall 2021; Spring 2022
California State University of Los Angeles

PRESENTATIONS

MaryGracy Antony, **Marisol Fermin Flores**, Jacqueline Valentino, Pleuni Pennings PhD. (2024) Harnessing Plasmids: Exploring Antibiotic Resistance in Community Biomedical Research. Poster presenting at the 3rd Joint Congress on Evolutionary Biology, Montreal, QC, Canada

Marisol Fermin Flores. (2024) Thriving through academia as a DACA Student. Webinar Speaker for the Summer Immersion Coding Program.

Marisol Fermin Flores, Pleuni Pennings PhD. (2024) Phylogenetic Approach to Understand the Evolution of Antibiotic Resistance in Mycobacterium Tuberculosis in Russia, China and South Africa. Poster presenting at The Allied Genetics Conference, Metro Washington, DC.

Marisol Fermin Flores, Pleuni Pennings PhD. (2024) Phylogenetic Approach to Understand the Evolution of Antibiotic Resistance in Mycobacterium Tuberculosis in Russia. Poster presented at 36th Annual California State University Biotechnology Symposium, Santa Clara California.

Marisol Fermin Flores, MaryGracy Anthony, Pleuni Pennings PhD. (2023) Phylogenetic Approach to Understand the Evolution of Antibiotic Resistance in Mycobacterium Tuberculosis. Poster presenting at SACNAS National Diversity in STEM Conference, Portland Oregon.

MaryGracy Antony, **Marisol Fermin Flores**, Jacqueline Valentino, Pleuni Pennings PhD. (2023) Antibiotic Resistance and Plasmids. Poster presented at the 21st Bay Area Population Genomics Conference (BAPG), University of California, Davis.

MaryGracy Antony, **Marisol Fermin Flores**, Jacqueline Valentino, Pleuni Pennings PhD. (2023) Antibiotic Resistance and Plasmids. Poster presented at CoSE Student Project Showcase, San Francisco State University, San Francisco C.A.

Christina Feng, **Marisol Flores**, Yixian Wang PhD. (2022). *Topographical Imaging of Neuroblastoma Cell Membranes Exposed to Alpha-Synuclein Pre-Formed Fibrils*. Poster presented at 34th Annual California State University Biotechnology Symposium.

TEACHING AND OUTREACH

Science Coding Immersion Program, SCIP, Coordinator and Teaching Assistant 2023 & 2024
San Francisco State University | San Francisco C.A

I supported the recruitment and logistics of the program, created teams for each course material, and provided resources and support for the participants

Volunteer Coding Instructor

2024

Monroe Elementary | San Francisco C.A | Mr. Hernandez's 4th grade class

Once a week, I volunteer at Monroe Elementary and use Scratch (online coding course) to teach a 4th grade class the basics of coding.

Research Experiences for Undergraduates (REU) program Mentorship

2023

San Francisco State University | San Francisco C.A

Assisted in a 6 week project; I taught them how to write an abstract, improve presentation skills, use linux, how to use and troubleshoot CARD and analyze the data in Python.

Student Assistant

2022

San Francisco State University | San Francisco C.A

I assisted in grading for the Biometry lab section

TECHNICAL AND LABORATORY SKILLS

- Scanning ion conductance microscopy (SICM)
- Cell culturing: SH-SY5Y neuroblastoma cell line
- Gwyddion
- R studio
- Python
- Linux
- bowtie2
- Samtools
- bcftools
- grep
- ggplot
- dplyr
- phytools
- Snippy
- NCBI and EBI database
- Leadership
- Administration

ADDITIONAL TRAINING

Graduate certificate for Data Science for Biology and Chemistry

2023

San Francisco State University

Collaborative Institutional Training Initiative (CITI) Program

2023