SAMANTHA Z. FERNANDES
Molecular & Cellular Biology Graduate Program
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EDUCATION

Florida International University (FIU), Miami, Florida
Bachelor of Science, Biological Sciences — December 2019
Bachelor of Science, Natural and Applied Sciences
- Chemistry Minor
- Latin American and Asian Studies Certificate

CURRENT LAB

Rasmussen Lab of Skin Sensory Development and Repair
University of Washington – Biology
Graduate Dissertation Researcher — June 2022 to Current
Mentor: Dr. Jeff Rasmussen
- Outlining the timeline of peripheral somatosensory axon regeneration in zebrafish skin
- Using live confocal imaging and transgenic tools to investigate the interaction of axons and neighboring cells in the skin
- Building transgenic tools to expand the scope of zebrafish regeneration research
- Studying the pathways and cues that guide injured axons to their targets again

https://jraslab.org/people/ - samantha-fernandes--mcb-graduate-student

RESEARCH EXPERIENCE

Phil Abitua Laboratory of Killifish Development
University of Washington – Genome Sciences
Graduate Rotation Researcher — March to June 2022
Mentor: Dr. Phil Abitua
- Studied the development of the Killifish in comparison to zebrafish system
- Applied UV energy and caspase induction drugs to measure the apoptotic resistance of Killifish vs Zebrafish embryos
- Used Tunel staining to measure cell death in whole embryos after apoptosis treatments
- Built transgenic tools in Killifish for live imaging of apoptosis in whole embryos
- Used cloning to adapt transgenic tools from other model systems for the killifish system
- Found that African turquoise killifish embryos are more resistant to UV damage and caspase activation than zebrafish

Moens Laboratory of Vertebrate Brain Development
Fred Hutch Cancer Research Institute – Basic Sciences
Graduate Rotation Researcher — January to March 2022
Mentor: Dr. Cecilia Moens
- Investigated the role of Planar Cell Polarity (PCP) proteins in commissural axon guidance during development
- Utilized CRISPR gene editing and microinjection in transgenic Zebrafish embryo to knock out PCP proteins
- Measured effect of axon guidance disruption with live imaging of commissural neurons in the developing embryo
- Produced RNA In-situ in zebrafish embryos to determine PCP protein expression in the central nervous system

Rasmussen Lab of Skin Sensory Development and Repair
University of Washington – Biology

Graduate Rotation Researcher September to December 2021
Mentor: Dr. Jeff Rasmussen

- Studied the role of Langerhans cells as skin resident macrophages during axon degeneration
- Used inhibitors of the RhoA pathway to disrupt actin cytoskeletal function of Langerhans cells to determine importance in morphology and taxis
- Conducted live-cell imaging of Langerhans cells in Zebrafish skin
- Found that with Rock inhibition Langerhans cells change cell area but not cell volume
- Quantified morphological changes of cells in live imaging with Imaris software
- Husbandry and maintenance of transgenic Zebrafish lines for study

https://jraslab.org/erik-sam-rotations/

Todd Laboratory for the study of Fragile X Syndrome
University of Michigan – Neurology

Postbaccalaureate Researcher July 2020 to June 2021
Mentor: Dr. Peter Todd

- Investigated the role of Repeat Associated Non-AUG (RAN) translation in fragile X-associated tremor/ataxia syndrome (FXTAS)
- Studied mechanisms of translation of FMR1 and the regulation of FMRP synthesis in neurons
- FXTAS and Fragile X Syndrome modeling and therapy development in patient stem cell-derived neuronal cultures

https://sites.google.com/site/toddlabmichigan/todd-lab#h.p_ID_301

DeGennaro Laboratory of Tropical Genetics
Florida International University – Biological Sciences

Undergraduate Researcher March 2017 to July 2020
Mentor: Dr. Matthew DeGennaro

- Used reverse genetic approach to understand *Aedes aegypti* mosquito host detection and appetitive behavior
- Determined the aspect of olfaction in *Aedes aegypti* mosquitoes' attractive behavior
- Developed molecular biology tools to enhance the understanding of mosquito sensory system
- Conducted and developed behavioral assays to identify the phenotypic expression of mutant mosquitoes
- Assessed mosquitoes' response to chemical screens through VR technology to measure response to factors of human odor stimuli.

http://www.degennarolab.org/samantha-fernandes

Mesecar Lab of the Structure & Function of Enzymes of Biomedical Importance
Purdue University – Biochemistry

Summer Research Intern May 2018 to August 2018
Mentor: Dr. Andrew Mesecar

- Found optimal techniques and conditions for the production, purification and crystallization of the SARS Co-V 3CL Protease for use in X-ray diffraction crystallography
- Learned Biochemistry and Structural biology techniques for working with proteins, including protein expression in bacterial cells, purification in FPLC systems, and crystallization
- Worked towards constructing inhibitor for SARS virus

AWARDS

- The University of Washington Cell and Molecular Biology (CMB) Training Grant, Current *University of Washington* (NIH 5T32 GM136534-02)
- NIH University of Michigan Postbacc Research Education Grant (UM PREP), 2020 *University of Michigan* (NIH R25 GM086262)
- Summa Cum Laude Academic Achievement, 2019, *Florida International University*
- NSF Research Experience for Undergraduates (REU) program, 2018 *Purdue University* (NSF 1757748)
- Ronald E. McNair Fellowship, 2018-2020, *Florida International University*
- TRIO SSS Program, 2016-2019, *FIU & Student Support Services*
- Dean's List Achievement, 2015-2019, *Florida International University*
- MPAS/SSS Academic Excellence Award, 2017-2019, *Florida International University*
- Florida Bright Futures Scholarship, 2015-2019, *Florida International University*

PUBLICATIONS

Original Research Abstract

Fernandes, S. Z., Anson, B., Mesecar, A. (2019) Crystallization of SARS Coronavirus 3CL Protease to Identify Inhibitor Targets. *FASEB Journal*, 493.4-493.4

PRESENTATIONS

Talks

2021 MCB First-Year Graduate Spring Rotation Talks
University of Washington, Seattle, Washington
"PCP guidance of spinal cord neurons"

2021 MCB First-Year Graduate Fall Rotation Talks
University of Washington, Seattle, Washington
"How does the cytoskeleton control the shape of skin macrophages?"

2019 FIU McNair Scholars Research Conference
Florida International University, Miami, Florida
"Using the Gal4/UAS System to manipulate Aedes aegypti mosquitoes"

2018 UNM McNair Scholars Research Conference
University of New Mexico, Albuquerque, New Mexico
"*Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets*"

2018 FIU McNair Scholars Research Conference
Florida International University, Miami, Florida
"Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets"

2018 Purdue Summer Undergraduate Internship Researchers Conference
West Lafayette, Indiana
"Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets"

2018 FIU McNair Summer Project Proposal
Florida International University, Miami, Florida
"*Building an Eye Pigment Mutant in Aedes aegypti Using CRISPR/Cas9 to Understand Host Seeking Behavior*"

Posters

2022 MCB First-Year Graduate Spring Poster Session, Seattle, WA
"*The Amazing Death-Defying Killifish: A study on the apoptotic resistance of the African Turquoise Killifish*"

2019 FIU First Generation Day Ronald E. McNair Presentations, Miami, FL
"*Using the Gal4/UAS System to manipulate Aedes aegypti mosquitoes*"

2019 FIU McNair Scholars Research Conference, Miami, FL
"*Using the Gal4/UAS System to manipulate Aedes aegypti mosquitoes*"

2019 FIU McNair Scholars Research Symposium, Miami, FL
"*Using the Gal4/UAS System to manipulate Aedes aegypti mosquitoes*"

2019 FIU Undergraduate Research, Miami, FL
"*Building an Eye Pigment Mutant in Aedes aegypti Using CRISPR/Cas9 to Understand Host Seeking Behavior*"

2019 Experimental Biology Research Conference, Orlando, FL
"*Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets*"

2018 University of New Mexico (UNM) McNair Scholars Research Conference, Albuquerque, NM
"*Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets*"

2018 FIU McNair Scholars Research Conference, Miami, FL
"*Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets*"

2018 Purdue Summer Undergraduate Internship Researchers Conference, West Lafayette, Indiana
"Crystallization of SARS-CoV 3CL Protease to Identify Inhibitor Targets"

2018 FIU Bio symposium, Miami, FL
"*Building an Eye Pigment Mutant in Aedes aegypti Using CRISPR/Cas9 to Understand Host Seeking Behavior*"

2018 FIU Flies on the Beach Vector Conference, Miami, FL
"*Building an Eye Pigment Mutant in Aedes aegypti Using CRISPR/Cas9 to Understand Host Seeking Behavior*"

LABORATORY SKILLS

CRISPR/Cas9 genome modification

- sgRNA Preparation: template generation, in vitro transcription, RNA purification
- Mutants: targeted mutagenesis, establishing mutant lines, and maintaining lines for experiments

Molecular Biology

- PCR: PCR, PCR clean up (Gel extraction and kit), colony PCR
- DNA: gel electrophoresis, plasmid purification (mini/midi preps), sanger sequencing, fragment analysis (capillary gel electrophoresis), Transformation, Bioanalyzer, DNA quantification
- RNA: in vitro transcription, RNA Extraction, RNA purification, RNA quantification and storage
- Histology: immunohistochemistry staining, DAPI Staining, tissue sectioning, slide preparation, RNA In-situ Hybridization, dissecting microscope, and confocal fluorescent microscope imaging
- Pipetting: transfer, stereological, multichannel, repeat Pipettor, and single channel

Microinjection of Embryos (Fish and Fly)

- Injection Solution: concentration calculation, injection Preparation, and storage
- Needle Preparation: needle Pulling, needle beveling, testing, and storage
- Embryo Preparation: embryo alignment, stage preparation, embryo injection, recovery and hatching

Biochemistry/ Proteins

- Protein Production: protein production in bacterial cells, protein extraction, purification (FPLC)
- Protein Analysis: protein activity assay, PAGE-gels, western blots, protein concentration assays
- Crystallization: buffer preparation, protein crystallization, protein crystal identification

Animal Husbandry

- Animal Rearing: mouse care handling and restraint, raising lines of mosquitos (mutant and WT), maintain consistent feeding and cleaning schedules, careful maintenance of male and female populations, zebrafish maintenance and crossing, egg collection and sorting
- Experimental Crosses: crossing of lines, collection of progenies, hatching, and family line tracking
- Maintenance: upkeep of animal raising equipment

Behavior Studies

- Experimental: conducting an experiment
- Consistency: maintaining controls, isolating variables, raising and maintain large stocks of animals
- Mosquito Virtual Reality: tethering for visual experiments and testing in visual arena

Tissue Culture

- Human Cell line Maintenance: thawing cells, passaging, growth and upkeep, media preparation, cell plating, tissue disassociation and plating
    - Somatic Cell Types: HEK293T, Hela Cells
    - Stem Cell Lines: H1 Nano Luciferase IPSC, H1 Nano Luciferase NPC, 2E IPSC
    - Primary Neuron Cultures: Rat Hippocampal Neurons
- Investigative Tissue Culture: experimental cell plating, DNA and RNA cell transfection, cell drug treatment, Nano luciferase and Firefly Assay

Bioinformatics

- **Python** (Basics): Jupyter Notebook, GitHub
- Sample Analysis: analysis of sequencing results, sequence alignments**,** BLAST, SnapGene, and SnapGene viewer, Peak Scanner
- Statistical Analysis: Excel, Google Sheets, Prism GraphPad (Basic), Illustrator (Basic)
- Imaging Process: Imaris, Image J Fiji

Remote Teaching and Event Planning

- Zoom Video Conferencing, BlueJeans Video Conferencing, Microsoft Outlook, Microsoft Teams, Student Access, Public Relations and Outreach, Qualtrics Survey Creator

COMMUNITY OUTREACH

Mentorship

2019-2020 SSS Peer Mentor (3 mentees)
2019 McNair Junior Scholars mentor (2 mentees)

Teaching Experience

2019-2020 Student Success Services Science Tutor (+90 students)
Biology I & II, Biochemistry, Microbiology, Analytical Chemistry, Neurobiology, Biotechnology, Evolution, Cell Biology, Genetics
2019 Sunset Presbyterian Church Summer Camp, Science/Art instructor (+100 students)
2018 Biochemistry Tutor (+5 students)
2017 FIU STEM Teach Science Instructor (+30 students)
2019-2020 Development and Implementation of Korean Language Course of KCC FIU
2020 Uni. of Michigan F.E.M.M.E.S. Capstone Science Outreach Series (20+ Students)

Invited as Speaker/ Panel

2019 First Generation Day Student Alumni Panel
2018 McNair Alumni Day Undergraduate Panel Speaker
2018 SSS First Generation Undergraduate Student Panel

Volunteer Experience

2019 Korean Culture Festival
2019 Sunset Presbyterian Church Thanksgiving Day Community Celebration
2019 FIU McNair Scholars Research Conference
2019 Sunset Presbyterian Church Vocational Summer Camp, Science/Art instructor
2019 Asian Cultural Festival, Korean Culture FIU Undergrad. Ambassador, Fruit & Spice Park
2018 Japanese Culture Festival
2018 FIU MARC Conference, Volunteer
2018 Flies on the Beach Science Conference, Volunteer

Event Planning and Committees

2018-2020 Korean Culture Club, Member: Recognized as the Most involved member
2017-2020 Connecting Cultures Club, Position: Historian
2018 Minority Women of Medicine
2019 FIU First Generation Day Planning Committee
2019 FIU Trio SSS Graduation Celebration Planning Committee
2019 Peer Mentorship Program Coordinator and Planning Committee
2019 FIU Trio SSS Club Planning Committee

LANGUAGES

- English, Native language
- Spanish, Intermediate
- Korean, Beginner

CERTIFICATION

Safety Certifications

CITI certificate for Biosafety, Bloodborne Pathogens, Compressed Gas Cylinder Safety, Environmental Awareness PT 1& 2, EPA: Hazardous Waste Awareness & Handling, Fire Safety, HAZCOM: In Sync with GHS, Laboratory Hazard Awareness, Laboratory Safety: The Finer Points, Personal Protective Equipment (PPE): Laboratory, Safe Handling of Biomedical Waste, Safe Use of Fume hoods, Small Spills and Leaks, Cyber Security, Laboratory Mouse and Rodent Care.

REFERENCES

- Jeff Rasmussen, Ph.D., University of Washington, rasmuss@uw.edu
- Phil Abitua, Ph.D., University of Washington, abitua@uw.edu
- Cecilia Moens, Ph.D., Fred Hutch Cancer Research Institute, cmoens@fredhutch.org
- Matthew DeGennaro, Ph.D., Florida International University, Email: mdegenna@fiu.edu
- Andre Luis da Costa da Silva, Ph.D., Florida International University, Email: adacosta@fiu.edu