Shaili Mathur

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Education

PhD Candidate | ***Biology*** — Sept. 2021 – ongoing
Stanford University — Stanford, USA
Thesis advisors: Dmitri Petrov and Jonas Cremer

Master of Science | ***Bioinformatics*** — Sept. 2019 – June 2021
University of California, Los Angeles — Los Angeles, USA
Thesis advisor: Van Savage

Bachelor of Science | ***Computational and Systems Biology & Mathematics (minor)*** — Sept. 2017 – June 2021
University of California, Los Angeles — Los Angeles, USA
Thesis advisor: Van Savage

Scientific Contributions

PUBLICATIONS

1. Clare I. Abreu, **Shaili Mathur**, and Dmitri A. Petrov (2024) "Strong environmental memory revealed by experimental evolution in static and fluctuating environments" ***Nature Ecology and Evolution***; doi:10.1038/s41559-024-02475-9
2. Lily Agranat-Tamir, **Shaili Mathur**, and Noah A. Rosenberg (2024) "Enumeration of rooted binary unlabeled galled trees", ***Bulletin of Mathematical Biology***; doi:/10.1007/s11538-024-01270-8
3. **Shaili Mathur** and Noah A. Rosenberg (2023). "All galls are divided into three or more parts: recursive enumeration of labeled histories for galled trees", ***Algorithms for Molecular Biology***; doi:10.1186/s13015-023-00224-4

TALKS

1. Molecular Mechanisms in Evolution (Gordon Research Seminar): "Order Matters: Decoupling the Contributions of Transitions and Growth to Fitness in Fluctuating Environments", Easton, MA 2023
2. B.I.G. Summer Undergraduate Research Program: "A Model for Cell-Antibiotic Dynamics across Bacterial Diversity", Los Angeles, CA 2020
3. Santa Fe Institute REU: "A priori prediction of Antibiotic Susceptibility across Bacterial Diversity", Santa Fe, NM 2019

POSTER PRESENTATIONS

1. **Shaili Mathur**, Clare I. Abreu, Manuel Razo-Mejia, Jonas B. Cremer, Dmitri A. Petrov. "Order Matters: Decoupling the Contributions of Transitions and Growth to Fitness in Fluctuating Environments", Molecular Mechanisms in Evolution (Gordon Research Conference), Easton, MA 2023
2. **Shaili Mathur**, Portia M. Mira, Pamela J. Yeh, Christopher P. Kempes, Van M. Savage. "Allometric Scaling of Antibiotic Efficacy", UCLA QC Bio 4th Annual Retreat, 2018
3. **Shaili Mathur**, Portia M. Mira, Pamela J. Yeh, Christopher P. Kempes, Van M. Savage. "Size Effects on Antibiotic Susceptibility", UCLA Undergraduate Research Poster Day, 2017

Research Experience

Graduate Research Assistant Jan 2021 - present

Stanford University

PhD Student co-advised by Dr. Dmitri Petrov and Dr. Jonas Cremer.

- Projects on the evolution and physiology of microbes in dynamically changing environments including high-throughput evolution and fitness measurements of DNA-barcoded *S. cerevisiae* in fluctuating environments and mathematical modeling of dynamic resource-allocation in fluctuating environments.

Attendee, Yeast Genetics and Genomics Course Summer 2023

Cold Spring Harbor Laboratory

Rotation Student, Rosenberg Lab Sept - Dec 2021

Stanford University

Rotation student supervised by Dr. Noah Rosenberg.

- Mathematical phylogenetics project developing an algorithm to enumerate labelled histories, a useful mathematical property of phylogenetic networks.

Undergraduate Researcher, UCLA Bruins In Genomics June - Aug 2020

University of California, Los Angeles

Summer undergraduate research supervised by Dr. Van Savage.

- Analysis of antibiotic susceptibility data for a project on the relationship between cell size and antibiotic susceptibility.

Undergraduate Researcher, Santa Fe Institute REU Program June - Aug 2019

Santa Fe Institute

Summer undergraduate research through the Santa Fe Institute Research Experiences for Undergraduates, supervised by Dr. Chris Kempes.

- Mathematical modeling of optimal antibiotic stress response across bacterial species.

Quantitative Biology Undergraduate Research Assistant Oct 2017 - May 2021

University of California, Los Angeles

Supervised by Dr. Van Savage in the Department of Ecology and Evolution and Department of Biomathematics at UCLA.

- Project on comparing data to theoretical predictions of network structure in lung vascular networks using alternative (Horton-Strahler) labelling.

Microbiology Undergraduate Research Assistant Oct 2017 - May 2021

University of California, Los Angeles

Supervised by Dr. Pamela Yeh in the Department of Ecology and Evolution at UCLA.

- High-throughput experiments to phenotypically measure antibiotic susceptibility of several bacterial species.

Honors and Awards

Bio-X Stanford Interdisciplinary Graduate Fellowship

Competitive Stanford-wide fellowship; three years of funding 2024-27

Stanford Graduate Fellowship, Gabilan Fellow

Department-nominated Stanford-wide fellowship; three years of funding 2021-24

Dean's Honor List

Recognition of high scholastic recognition in any one term at UCLA; all quarters except Spring 2019

UCLA Undergraduate Research Scholars Program 2020

Merit based scholarship to support upperclassmen conducting advanced STEM research projects at UCLA

Whitcome Summer Undergraduate Research Fellowship Summer 2018
Merit based scholarship supporting summer research in ecology and evolutionary biology at UCLA

UCLA Undergraduate Research Fellows Program Winter, Spring 2018
Merit based scholarship supporting students doing STEM research at UCLA

Appointments

UCLA Computational & Systems Biology Interdepartmental Program Advisory Committee 2019-2021
Student Representative

Teaching & Mentorship

Research Mentor at Stanford Community College Outreach Program Spring, Summer 2024
Mentoring an undergraduage intern, Sofia Peneva

Bio 143: Quantitative Methods for Marine Ecology and Conservation Winter 2022
Teaching assistant with Dr. Giulio De Leo

Bio 165: Quantitative Cell Biology: from Molecules to Evolution Winter 2023, 2024
Teaching assistant with Dr. Jonas Cremer

Skills and Relevant Coursework

Programming: Python; MATLAB; Mathematica; R; Julia; C++; MySQL
Research: Yeast Genetics and Genomics, Cold Spring Harbor Laboratory (2023)

Graduate Level Coursework at Stanford:
Introduction to Causal Inference; Topological Data Analysis; Principles of Cell Signalling
Graduate Level Coursework at UCLA :
Bioinformatics Courses (Graduate Level): Statistical Methods in Computational Biology; Machine Learning in Bioinformatics; Algorithms in Bioinformatics; Applied Bayesian Inference
Biomathematics Courses (Graduate Level): Structure, Function and Evolution of Biological Systems; Top Computational Algorithms; Evolutionary Ecology
Undergraduate Level Coursework at UCLA :
Mathematics Coursework (Upper Division Undergraduate Level): Mathematical Statistics; Linear Algebra; Linear and Non-linear Systems of Ordinary Differential Equations; Ordinary Differential Equations; Probability Theory I and II; Stochastic Processes; Mathematical Game Theory; Introduction to Networks; Real Analysis; Complex Analysis; Discrete Mathematics
Computer Science Courses: Data Structures; Algorithms and Complexity; Introduction to Data Mining
Life Science Coursework: Evolutionary Ecology (graduate level); Biological Modeling: Mathematical and Computational Approaches; Cell and Molecular Biology; Genetics; Ecology and Evolution; Physiology and Human Biology
UCLA QCB Collaboratory Technical Workshops: Machine Learning with Python; Advanced Python; Introduction to Modern Statistics Python for Data Science
Online (MOOC) classes: Python for Data Science (Online course through Microsoft on EdX); Relational Databases and SQL (Online course through StanfordOnline on EdX)

Outreach and Service

Stanford Ecology and Evolution Lunch Seminar Series 2022 - current
Organizer

Stanford Biology Department Mentorship Committee 2022 - current
Committee Member

Stanford Biology Department Orientation Committee 2022 - current
Committee Member

Stanford Biology Department Interview Committee 2021 - current
Chair, Committee Member

Letters to Pre-Scientists 2019 - 2021
Scientist Pen Pal

Computational and Systems Biology Undergraduate Seminar Series 2-18 - current
Organizer Los Angeles, USA