# FUMINORI TANIZAWA

909-905-9558 | ftanizawa@hmc.edu | fuminoritanizawa.com | Claremont, CA

## EDUCATION

**Harvey Mudd College** Claremont, CA
B.S. in Mathematical and Computational Biology Aug 2021 - May 2025 (expected)
Humanity concentration in Environmental Analysis GPA 3.92/4.00 (Major 3.96)

Selected Coursework: Molecular Genetics, Molecular Immunology, Biostatistics, Evolutionary Biology, Developmental Biology, Advanced Computational Biology, Data Structures, Program Development

## PUBLICATIONS

- **Tanizawa F**, Takemoto H. Sleep contributes to preference for novel food odours in *Drosophila melanogaster*. *Sci Rep*. 2021 Apr 30;11(1):9395. doi: 10.1038/s41598-021-88967-1.

## PRESENTATIONS

- **Tanizawa F**, So J., Beaver A., Singer L., Mugnier M. "Characterizing the Effect of the Extravascular Environment on *Trypanosoma brucei* Antigenic Diversity." *Johns Hopkins Career, Academic, and Research Experiences for Students Symposium*. Johns Hopkins School of Medicine, Baltimore, MD, July 2024.
- **Tanizawa F**, Liu C.C., Perez P.A., Srinivasan S. "Genomic Regulators of Lipid Metabolism and Longevity in *C. elegans*." *The 2023 Southern California Conference for Undergraduate Research*. California State University, Long Beach, CA, November 2023.
- **Tanizawa F**, Gowri V., Monteiro A. "Behavioral Effects of Odorant Injection on Larvae and Eggs of *Bicyclus anynana*." *2022 Amgen Scholars Asia Symposium*. National University of Singapore, Singapore, August 2022.
- **Tanizawa F**, Takemoto H. "Sleep Contributes to Preference for Novel Food Odours in *Drosophila melanogaster*." *The Animal Behavior Society Annual Meetings 2020*. The Animal Behavior Society, Virtual Conference, July 2020.

## RESEARCH EXPERIENCE

**Harvey Mudd College** Claremont, CA
*Senior Thesis Student* Aug 2024 – Present
*Mentored by Dr. Jae Hur, Department of Biology*
Project: Role of ClpXP Protease in Innate Immunity of *Drosophila melanogaster*

- Investigated the role of mitochondrial matrix protease *ClpXP* in modulating innate immune responses in *Drosophila melanogaster* using mild *ClpXP* overexpression models.
- Engineered a GAL4-UAS RNAi knockdown strain targeting *ClpXP* to assess its specific role in immune signaling pathways.
- Developed and optimized protocols for bacterial infection assays, qPCR to measure antimicrobial peptide expression, and bacterial load assays using antibiotic-resistant *Escherichia coli* for comprehensive immune response analysis.

**Johns Hopkins University** Baltimore, MD
*Summer Undergraduate Research Fellow* May 2024 – Aug 2024
*Mentored by Dr. Monica Mugnier, Department of Molecular Microbiology and Immunology*
Project: Characterizing the Effect of the Extravascular Environment on *Trypanosoma brucei* Antigenic Diversity

- Investigated how the extravascular environment influences antigenic variation in *Trypanosoma brucei*, with a focus on its immune evasion strategies.
- Developed and implemented protocols for isolating extracellular fluid (EF) from key organs (heart, lungs, and gonadal fat) of *T. brucei*-infected mice, using IV injections, cardiac puncture, and perfusion, followed

by SDS-PAGE analysis.

- Conducted ELISA on EF samples, revealing significantly reduced IgG/M levels, suggesting that decreased immune pressure in extravascular spaces may drive antigenic variation in *T. brucei*.
- Presented these findings at the Johns Hopkins CARES Symposium, highlighting the implications for understanding immune evasion in parasitic infections.

**Harvey Mudd College** Claremont, CA
*Undergraduate Researcher* Sep 2023 – May 2024
*Mentored by Dr. Danae Schulz, Department of Biology*
Project: Role of HAT Complex Protein EAF6 in Lifecycle Differentiation of *Trypanosoma brucei*

- Engineered an RNAi plasmid targeting EAF6, a key component of the HAT complex, to investigate its regulatory role in *Trypanosoma brucei* lifecycle transitions between bloodstream and insect forms.
- Transformed *T. brucei* with an EP1-GFP reporter system to enable real-time monitoring of lifecycle differentiation under RNAi conditions.
- Utilized flow cytometry to quantify EP1-GFP expression, successfully troubleshooting RNAi system leakage and confirming EAF6's critical role in facilitating differentiation.

**Scripps Research** La Jolla, CA
*Summer Undergraduate Research Fellow* May 2023 – Aug 2023
*Mentored by Dr. Supriya Srinivasan, Department of Neuroscience*
Project: Genomic Regulators of Lipid Metabolism and Longevity in *C. elegans*

- Designed five rescue constructs to investigate the role of the key metabolic regulator *hlh-11*, incorporating tissue-specific promoters (neuron, coelomocyte, glia, intestine, hypodermis), *hlh-11* cDNA, a fluorescent protein, and a UTR for precise functional analysis.
- Engineered a global *hlh-11* knockout using CRISPR/Cas9 technology, including the design of sgRNA and repair templates, and screened knockouts using the *dpy-10* phenotype as a co-CRISPR marker to ensure efficiency.
- Crossbred *hlh-11* knockout lines with GFP-tagged rescue constructs to monitor tissue-specific gene expression, successfully confirming recombination through PCR and fluorescence microscopy.

**National University of Singapore** Singapore, Singapore
*Amgen Asia Scholar* May 2022 – Aug 2022
*Mentored by Dr. Antonia Monteiro, Department of Biological Sciences*
Project: Behavioral Effects of Odorant Injection on Larvae and Eggs of *Bicyclus anynana*

- Conducted behavioral assays on the African butterfly *Bicyclus anynana* to investigate transgenerational inheritance of learned odor preferences, contributing to the understanding of epigenetic mechanisms.
- Designed and implemented experiments demonstrating that larvae can acquire and transmit novel host plant odor preferences, offering insights into the heritability of learned behaviors.
- Provided evidence for the transmission of learned preferences across generations, contributing to the understanding of ecological speciation and host plant adaptation.

**Japan Science and Technology Agency** Shizuoka, Japan
*Visiting High-School Student* Jul 2018 – Apr 2021
*Mentored by Dr. Hiroyuki Takemoto, Research Institute of Green Science and Technology*
Project: Sleep Contributes to Preference for Novel Food Odours in *Drosophila melanogaster*

- **First-author of a peer-reviewed publication in *Scientific Reports***, presenting research on the role of sleep in sensory-driven behaviors at the International Animal Behavior Society conference.
- Conducted comprehensive behavioral studies to examine how sleep influences olfactory food preferences in *Drosophila melanogaster*, validating findings through controlled experimental designs.
- Designed and built a custom sleep deprivation centrifuge and infrared activity monitoring system to investigate the link between sleep patterns and olfactory-driven behaviors.

## TEACHING EXPERIENCE

**Biology Department Writing Fellow** Harvey Mudd College
*Writing Fellow* Sep 2024 – Present

- Mentored approximately 40 sophomore students in BIOL054 Experimental Biology Laboratory and BIOL154 Biostatistics, focusing on improving clarity, structure, and data presentation in lab reports.
- Provided tailored feedback in one-on-one mentoring sessions, helping students enhance their scientific argumentation, writing mechanics, and overall communication of complex biological concepts.

**BIOL113 Molecular Genetics** Harvey Mudd College
*Teaching Assistant and Grader* Sep 2023 – Present

- Led weekly discussion sessions on key genetic mechanisms, including DNA replication, transcription, and gene expression, for 25-30 sophomore and junior students.
- Provided hands-on support during laboratory exercises, guiding students through PCR techniques, gel electrophoresis, and molecular cloning, ensuring proper understanding and execution of protocols.

**BIOL046 Introduction to Biology** Harvey Mudd College
*Teaching Assistant and Grader* Jan 2023 – Present

- Led review sessions for 20-25 first-year students, covering foundational topics such as cell structure, genetics, and evolution, fostering deeper comprehension.
- Graded quizzes and written assignments for a class of 200, providing detailed feedback to correct misconceptions and support student learning.

**MATH055 Discrete Mathematics** Harvey Mudd College
*Teaching Assistant and Grader* Sep 2024 – Present

- Graded assignments on mathematical proofs, set theory, and combinatorics for 40-50 sophomore students, providing in-depth feedback to reinforce understanding.
- Held weekly office hours to support students with challenging concepts and problem-solving strategies in discrete mathematics.

**CSCI060 Principles of Computer Science** Harvey Mudd College
*Teaching Assistant* Sep 2024 – Present

- Led review sessions and office hours for 40-50 students, clarifying algorithms, data structures, and programming languages (Java, Racket) to enhance understanding of core concepts.
- Assisted with homework assignments and exam preparation, focusing on complexity analysis and theoretical aspects of computer science.

## LEADERSHIP & SERVICE

**Event Staff Coordinator**, Harvey Mudd College Jan 2022 – Dec 2023
Coordinated logistics and managed student event staff for on-campus social events, ensuring safe operations.

**Residential Manager**, Living Learning Community Sep 2022 – Feb 2023
Managed community-focused activities to foster engagement and build a supportive living environment.

**Volunteer**, The Prison Education Project Aug 2022 – Dec 2022
Assisted in creating educational materials and providing writing support for incarcerated learners.

**Workshop Leader**, Atelier Basi May 2021 – Dec 2021
Led workshops for high school students preparing study abroad applications, focusing on essay writing.

**Volunteer**, Ministry of Education Cultural Exchange Program Aug 2020 – Sep 2020
Participated in a cultural exchange program in Ghana and Japan, supporting educational activities.

## HONORS & FELLOWSHIPS

**Academics**
Dean's List, Harvey Mudd College 2021 – Present

**Research**

Johns Hopkins University BSI-SIP Scholar 2024
National University of Singapore Amgen Scholar 2022
Grand Prize Winner, Japan Science and Technology Agency National Research Presentation Nov 2020
Grand Prize Winner, Japan National High School Student Biology Summit Aug 2020

**Fellowships**
Tadashi Yanai Foundation, Full-ride Scholarship ($115K/year) 2021 – 2025
Masason Foundation, Research Grants ($35K) 2018 – 2025
Ben Huppe '14 Memorial Internships Fellowship, Summer Aid 2023
John and Miyoko Davey Foundation, Living-expense 2021-2023

## TECHNICAL STRENGTHS

**Programming & Bioinformatics Tools**
- Advanced in: Python, R, MATLAB, C++, Java, Arduino, HTML/CSS, LaTeX, Git

**Molecular Techniques (5 years lab experience)**
- **Gibson Assembly**: Plasmid design, PCR, miniprep, gel extraction, bead cleanup, heat shock transformation
- **Measurement Tools**: Flow cytometry, ELISA, Reverse Transcription-PCR, qPCR, immunoprecipitation, Western blot, SDS-PAGE, BCA assay
- **Gene Editing**: CRISPR-Cas9 (sgRNA & repair template design, gene knockout/knockdown), RNAi (Tet-On/Tet-Off, GAL4-UAS)

**Model Organism Techniques**
- ***Trypanosoma brucei***:
  - Routine culture maintenance, parasitemia quantification
  - Electroporation for plasmid transformation, including RNAi constructs
- ***Drosophila melanogaster***:
  - Routine fly maintenance, sex differentiation
  - Casein-FITC and AMC protein degradation assays, climbing and lifespan assays
  - Mitochondrial isolation and lysis, RNA extraction
  - Immunological assays: Bacterial infection, peptide expression, and bacterial load assays.
- ***Caenorhabditis elegans***:
  - Routine culture maintenance, culture preparation, picking, basic genotyping
  - Lifespan assays, immunofluorescent screening
- **Mus musculus**:
  - Mouse handling, restraint, and general care
  - IV and IP injections, submandibular and tail blood collection, cardiac puncture, perfusion, tissue extraction
  - Anesthetization, behavioral studies
- **Bicyclus anynana**:
  - Routine maintenance, sex differentiation
  - Behavioral assays, dissection

**Languages**
- English & Japanese (Bilingual)