Fuminori Tanizawa

UNDERGRADUATE STUDENT – Computational Biology

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EDUCATION

Harvey Mudd College   Sep. 2021 - May 2025 (expected)
B.S. in Mathematical and Computational Biology   Claremont, CA

- Overall GPA: 3.92; Major GPA: 3.96; Dean's List all semesters
- Selected Coursework: Molecular Genetics, Molecular Immunology, Biostatistics, Evolutionary Biology, Developmental Biology, Advanced Computational Biology, Data Structures, Program Development, Scientific Computing
- TA/Grader: Molecular Genetics, Intro Bio, Discrete Math, Principles of CS; Chosen as Biology Writing Fellow.

PUBLICATIONS

2021   **Tanizawa, F.**, Takemoto, H. Sleep contributes to preference for novel food odours in *Drosophila melanogaster*. *Scientific Reports* 11, 9395 (2021)

EXPERIENCE AND PROJECTS

Johns Hopkins University   May 2024 – Aug 2024
Molecular Immunology of T. brucei — Monica Mugnier, Ph.D.   Baltimore, MA

- Investigated the impact of the extravascular environment on antigenic variation in *Trypanosoma brucei*, a key parasite invasion mechanism, by developing protocols for extracting extracellular fluid (EF) from the organs of infected mice.
- Performed precise dissections and evaluated techniques such as blood washing, perfusion, and centrifugation to isolate EF with minimal contamination, validated by 108 samples through SDS-PAGE analysis.
- Proposed low immune pressure as a potential driver of antigenic variation by establishing an EF extraction method and conducting ELISA for IgG/M on the extracted EF.

Harvey Mudd College   Sep 2023 – May 2024
Molecular Immunology of T. brucei — Danae Schulz, Ph.D.   Claremont, CA

- Engineered an RNAi plasmid targeting a part of the HAT complex in *Trypanosoma brucei*, the parasite causing African sleeping sickness, to study its role in the parasite's lifecycle transitions between Bloodstream and Insect forms.
- Electro-transformed an RNAi plasmid into *T. brucei*, incorporating an EP1-GFP reporter system to enable real-time monitoring of procyclin expression, encoded by the EP1 gene, as a proxy for lifecycle differentiation.
- Performed detailed flow cytometry to track EP1-GFP expression in *T. brucei*, uncovering EAF6's critical role in facilitating differentiation and indicating potential RNAi system leakage.

Scripps Research   May 2023 – Aug 2023
Neuroscience of C. elegans — Supriya Srinivasan, Ph.D.   La Jolla, CA

- Constructed and cloned five rescue plasmids to explore a target gene's function, incorporating tissue-specific promoters, cDNA of interest, a fluorescent protein, and a UTR into the *pUC19* vector plasmid.
- Engineered a global knockout of a key gene, deleting all six exons ($\sim 3{,}500$ bp), designing the sgRNA and repair template with an EcoRI site, and screening using the *dpy-10* phenotype as a Co-CRISPR marker.
- Generated a worm strain by crossbreeding a gene mutation line with a rescue construct line of the target gene tagged with green fluorescent protein. Screened the crosses using PCR and microscopy.

Japan Science and Technology Agency   Jul 2018 – Apr 2021
Behavioral Biology of D. melanogaster — Hiroyuki Takemoto, Ph.D.   Shizuoka, Japan

- Performed comprehensive behavioral analyses of *Drosophila melanogaster*, focusing on sleep patterns and olfactory food preferences, utilizing my unique custom-designed experimental apparatuses such as a sleep deprivation centrifuge and an infrared activity monitoring device.
- **First-authored a peer-reviewed article** in *Scientific Reports* (Nature Publishing Group) and **orally presented** my project at the International Animal Behavior Society conference, elucidating the role of sleep in food odor preference in *D. melanogaster*.

National University of Singapore   May 2022 – Aug 2022
Evolutionary Development of B. anynana — Antonia Monteiro, Ph.D.   Singapore, Singapore

- Conducted a detailed study on the transgenerational inheritance of learned odor preferences in *Bicyclus anynana*, providing insights into epigenetic inheritance mechanisms.
- Designed and executed experiments that demonstrated larvae could learn and pass on novel host plant odor preferences, contributing to our understanding of insect behavior and adaptation.
- Showed the ability of *B. anynana* to transmit learned preferences for novel odors to subsequent generations, highlighting the implications for ecological speciation and host plant shifts.

Google Research   Jan 2023 – May 2023
Bioinformatics via CS Research Mentorship Program — Albert Cohen, Ph.D.   Online

- Engineered and optimized a Python-based search algorithm for selecting optimal PCR amplicons in *E. coli* DNA, utilizing bioinformatics tools such as Primer3 and Biopython libraries, enhancing computational efficiency and achieving maximal accuracy thresholds.
- Developed and implemented advanced evaluation criteria for 88 DNA samples, incorporating metrics such as GC content, melting temperature (Tm), and specificity to markedly improve the precision and reliability of genetic analysis, and designed in-silico PCR simulations to validate the performance of selected amplicons.
- Accelerated the processing speed of BLAST for sequence alignment tasks, yielding significant performance enhancements in PCR optimization workflows by parallelizing computations and optimizing query handling.

AWARDS & FELLOWSHIPS

Awards	Nov. 2020	**Grand Prize Winner, Minister of Education, Science and Technology Award**: Japan Science and Technology Agency National High School Student Research Presentation
	Aug. 2020	**Grand Prize Winner, Minister of Health, Labor and Welfare Award**: Japan National High School Student Biology Summit
Fellowships	2021 – 2025	**Tadashi Yanai Foundation** Full-ride Scholarship. ($105K/year)
	2018 – 2025	**Masason Foundation** Research Grants. ($35K)
	2023	**Ben Huppe '14 Memorial Internships Fellowship** Summer Aid. ($7K)
	2021 – 2023	**John and Miyoko Davey Foundation** Living-expenses. ($12K/year)

TECHNICAL SKILLS

Languages	English & Japanese (Bilingual)
Programming Tools	Advanced in R, Python, MATLAB, C++, Java, Arduino, HTML/CSS, LaTeX, Git
Molecular Techniques	Gel Extraction, Miniprep, Bead Cleanup, PCR, RT-PCR, ELISA, Immunoprecipitation, Plasmid Design, Gibson Assembly, RNAi (Tet-On/Tet-Off), CRISPR-Cas9 (sgRNA & Repair Template Design, Genetic Screening)
Transformation Methods	Heat-shock, Electroporation
Protein Analysis	Western Blot, SDS-PAGE, BCA Assay
Microscopy	General Microscopy Techniques, Confocal Microscopy (Nikon A1)
Mouse Techniques	Handling and Restraining Mice, IV and IP Injections, Submandibular and Tail Blood Collection, Anesthetization, Mouse Behavior Studies
Animal Handling	*Mus musculus*, *Drosophila melanogaster*, *Caenorhabditis elegans*, *Trypanosoma brucei*, *Bicyclus anynana*

Last updated: August 20, 2024