# Jonathan Mah

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## Education

**University of California, Los Angeles** Sep 2020 - Present
Ph.D. Bioinformatics Expected June 2026

**University of Washington, Seattle** June 2016 - June 2020
B.S. Biochemistry (With Honors), and Microbiology (With Distinction)

## Research

**Thesis Research, Bioinformatics IDP** June 2021 - Present
*Coadvised by Professor Kirk Lohmueller and Professor Nandita Garud.*
Statistical methods for inference of demography and selection within and across species.

- Comparative population genomics using metagenomic samples from the Human gut microbiome.
- Quantifying the systematic impact of sample size on SFS-based inference of population demographic history.
- Testing for differences in population genetics summary statistics between commonly-used datasets.

**First Year Lab Rotations, Bioinformatics IDP** Sep 2020 - June 2021
*Advised by Professor Sriram Sankararaman, University of California, Los Angeles.*
Project: Inference of Maximum Likelihood Network Orientation for Admixture Graphs.

- Performed simulation study modeling admixture graphs and implemented optimization method for maximum likelihood network orientations.

*Advised by Professor Nandita Garud, University of California, Los Angeles.*
Project: Demographic Inference for Common Commensal Gut Bacteria.

- Developed bioinformatics pipeline to infer population demographic histories from pseudo-isolate gut microbiome samples at single-strain resolution.

*Advised by Professor Kirk Lohmueller, University of California, Los Angeles.*
Project: Detection of Recessive Deleterious Mutations

- Developed novel statistical method to detect recessive deleterious mutations using departures from Hardy-Weinberg Equilibrium.

**Honors Thesis Research, Department of Microbiology** Feb 2018 - June 2020
*Advised by Dr. Jesse Bloom, Fred Hutchinson Cancer Research Center.*
Project: Identifying Sites Under Positive Selection on Viral Proteins.

- Implemented random-effects-likelihood approach towards inferring site-specific positive selection pressure on viral proteins.

**UCLA Bruins-in-Genomics SPUR** June 2019 - August 2019
*Advised by Professor Kirk Lohmueller, University of California, Los Angeles.*
Project: Quantifying the Statistical Power in the Inference of the Evolution of the Distribution of Fitness Effects in Canine Lineages.

- Performed forward population genetics simulations to model canine evolution.
- Developed bioinformatics pipeline to infer demographic parameters and the underlying distribution of fitness effects in simulated and empirical canine lineages.

## Publications

1. **Mah, J.C.**, Lohmueller, K.E., Garud, N.
"Inference of the Demographic Histories and Selective Effects of Human Gut Commensal Microbiota Over the Course of Human History".
*Molecular Biology and Evolution* (2025)

## Preprints

1. **Mah, J.C.** and Lohmueller, K.E.
"Inference of population demographic history captures differing evolutionary signals based on the number of individuals in the dataset." *in preparation* (2026)

2. Lin, M., Chakraborty, S., Amorim, C.E.G., Nigenda-Morales, S.F., Beichman, A.C., Nunez-Valencia, P.G., **Mah, J.C.,** Robinson, J.A., Kyriazis, C.C., Huber, C.D., Webb, A.E., Kocher, S.D., Archer, F.L., Moreno-Estrada, A., Wayne, R.K., Lohmueller, K.E. "The distribution of fitness effects varies phylogenetically across animals." *BiorXiv* (2025).

3. Amorim, C.E.G., Di, C., Lin, M., Marsden, C. Del Carpio, C.A., **Mah, J.C.,** Robinson, J., Kim, B.Y., Mooney, J.A., Cornejo, O.E., Lohmueller, K.E. "Evolutionary consequences of domestication on the selective effects of new amino acid changing mutations in canids." *BiorXiv* (2024)

## Teaching and Outreach

**Department of Ecology and Evolutionary Biology, UCLA**

Graduate Teaching Assistant for EEB 121: Molecular Evolution. Aut 2024

- Facilitated two 20-person discussion sections.
- Designed theoretical and applied molecular evolution problem-solving exercises.
- Graded bi-weekly homework essays.

Graduate Teaching Assistant for EEB 135/235: Population Genetics. Spring 2022, 2024, 2025

- Facilitated two 15-person discussion sections.
- Assisted in writing, grading, and proctoring written examinations.
- Wrote and graded weekly homework assignments.
- Developed comprehensive lesson plans for combined undergraduate and graduate population genetics course.

**Graduate Student Association, UCLA** September 2021 - 2023

Biological Sciences Council, Bioinformatics Representative.

- Managed a yearly budget of $\approx$ \$1500 to fund interdepartmental social events.
- Organized professional development workshops for UCLA graduates students in the Biosciences, e.g., Microsoft Office, LaTeX, Unix processing.
- Funded several DEI programs supporting queer and disabled graduate student workers in the Biosciences.

**Undergraduate Research Program, University of Washington** Oct 2019 - June 2020

Undergraduate Research Leader.

- Organized outreach activities to increase involvement in undergraduate research.
- One-to-one mentoring through "The Brotherhood Initiative", a program which connects male students of color to facilitate increased access to undergraduate research opportunities.

**School of Medicine, University of Washington** Sep 2019 - Dec 2019

Undergraduate Teaching Assistant for MICROM 302: General Microbiology Laboratory.

- Facilitated a lecture and laboratory course for two sections of 16-24 students.
- Assisted in writing, grading, and proctoring written examinations.
- Assisted in testing, designing, and proctoring practical examinations.

## Awards & Fellowships

**Dissertation Year Fellowship** July 2025 - June 2026
Division of Graduate Education, UCLA

**Systems in Integrative Biology T32 Training Grant** Oct 2021 - Oct 2023
Quantitative and Computational Biology, UCLA

**UCLA First-year GPB Fellowship** July 2020 - June 2021
Graduate Programs in Biosciences, UCLA

**Washington Research Foundation Fellowship** Oct 2019 - June 2020
Washington Research Foundation

**Herschel-Roman Scholarship** Sep 2019 - June 2020
Department of Genome Sciences, University of Washington

**Undergraduate Research Award** Dec 2018 - Aug 2019
Department of Microbiology, University of Washington

**Mary Gates Research Scholarship** Dec 2018 - June 2019
Mary Gates Endowment

## Selected Presentations

1. **Mah, J.C.**, Lohmueller, K.E.
How does the number of individuals studied influence the evolutionary stories we infer from population genetic data? *Southern California Evolutionary Genetics and Genomics Meeting.* Los Angeles, CA (2026). Oral.

2. **Mah, J.C.**, Lohmueller, K.E., Garud, N.
Inference of Selection and Demography in the Human Gut Microbiome. *Population, Evolutionary, and Quantitative Genetics.* Washington DC., (2024). Poster.

3. **Mah, J.C.**, Lohmueller, K.E., Garud, N.
Inference of demographic histories and distributions of fitness effects of deleterious mutations from human gut microbiomes.
*Quantitative and Computational Biology Symposium.* Los Angeles, CA (2023). Oral

4. **Mah, J.C.**, Lohmueller, K.E., Garud, N.
Inference of the Demographic History of Commensal Gut Microbes.
*Population, Evolutionary, and Quantitative Genetics.* Pacific Grove, CA (2022). Poster.

5. **Mah, J.C.**, Hilton, S.K., Bloom, J.D.
Identifying Sites Under Positive Selection on Viral Proteins.
*The Allied Genetics Conference.* Online (2020). Oral Presentation

6. Guardado, M.A.*, **Mah, J.C.***, Garcia, J.A., Amorim, C.E.G., Lohmueller, K.E.
Quantifying the Statistical Power in the Inference of the Evolution of the Distribution of Fitness Effects in Canine Lineages. *UCLA Bruins-In-Genomics Summer Program for Undergraduate Research Symposium.* Los Angeles, CA (2019). Poster.

7. **Mah, J.C.**, Hilton, S.K., Bloom, J.D. Identifying Sites Under Positive Selection on Influenza Hemagglutinin. *University of Washington Undergraduate Research Symposium.* Seattle, WA (2019). Poster.

## References


Professor Kirk Lohmueller
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Professor C. Eduardo Amorim
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Arizona State University
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