Arya Kaul, Ph.D. *Boston, MA*

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Professional Summary

Computational biologist who recently defended a Ph.D. in Bioinformatics and Integrative Genomics at Harvard Medical School, where I studied bacterial genome dynamics under Dr. Michael Baym. My doctoral work spanned three projects: characterizing a novel mechanism of gene birth arising from genomic deletions across the bacterial tree of life; quantifying how the antibiotic era reshaped the frequency and mobility of resistance genes in historical clinical isolates; and developing phylogeny-colored de Bruijn graphs for scalable genomic architecture queries. Beyond the bench, I deployed LLM systems at the Asian Development Bank, taught bioinformatics in Rwanda, wrote longform science journalism as an Asimov Press Writing Fellow, and organized science policy programming for Harvard graduate students.

Education

Harvard Medical School
Ph.D., Bioinformatics and Integrative Genomics *Spring 2026*

University of California, San Diego
B.S., Bioengineering: Bioinformatics *Jun 2019*

Technical Skills

Programming: Python (NumPy, SciPy, Pandas, PyTorch), Rust, C++, R, SQL, Bash, Agentic coding harnesses (Claude Code, Codex, Pi)

Tools & Systems: Distributed computing, Workflow software (Snakemake/Nextflow), LLM evals & RAG pipelines, Git, Docker, UNIX, LaTeX

Doctoral Research

Baym Lab, Harvard Medical School — Department of Biomedical Informatics
PhD Researcher *Oct 2020 – Apr 2026*

- Characterized a novel mechanism of gene birth in bacteria arising from genomic deletions, validated across millions of bacterial genomes using a scalable k-mer-based structural variant pipeline.
- Quantified how the antibiotic era reshaped the frequency and mobility of resistance genes by analyzing pre- and post-antibiotic-era historical clinical isolates.
- Developed phylogeny-colored de Bruijn graphs, a novel data structure for querying complex genomic architectures at scale.
- Awarded Chateaubriand Fellowship for 6-month collaborative research stay at Inria's GenScale lab (Dr. Karel Brinda) in Rennes, France.

Professional Experience

Office for Safeguards — Asian Development Bank, Philippines
Generative AI Fellow *Summer 2024*

- Designed, built, and deployed RAG-powered LLM chatbots to production, grounded in organization-specific internal documents.
- Built automated evaluation frameworks to stress-test model accuracy and reliability on sensitive internal content.
- Implemented safety guardrails and adversarial testing to minimize hallucinations and ensure responsible AI deployment.
- Trained non-technical stakeholders on LLM risks, capabilities, and prompting best practices.

Institute for Global Health Equity Research — University of Global Health Equity, Rwanda
Research Fellow *Spring 2024*

Developed computational biology curriculum and mentored researchers at a university founded by Partners In Health, emphasizing data sovereignty and ethical research practices. Contributed to grant proposals for the newly established institute.

50Y PhD2VC Program — 50 Years
Fellow *Feb – Apr 2021*

Learned how venture capital firms evaluate and fund deep tech startups; performed due diligence on potential portfolio companies in life sciences and computational biology.

Selected Publications (Full list: Google Scholar)

1. **Arya Kaul**, Fernando Rossine, Karel Brinda, Michael Baym. Novel genes arise from genomic deletions across the bacterial tree of life. *bioRxiv*, Jan 2026.

2. **Arya Kaul**, Célia Souque, Mische Holland, Michael Baym. Genomic resistance in historical clinical isolates increased in frequency and mobility after the age of antibiotics. *Microbial Genomics*, Sep 2025.

3. **Arya Kaul**, Sourya Bhattacharyya, and Ferhat Ay. Identifying statistically significant chromatin contacts from Hi-C data with FitHiC2. *Nature Protocols*, Mar 2020.

Writing & Science Communication

Asimov Press / Works in Progress

Writing Fellow *2025*

Selected as a 2025 Writing Fellow to produce monthly longform articles on scientific and technological progress. Asimov Press and Works in Progress publish rigorous, accessible writing at the intersection of science, technology, and society.

Personal Essays — `essays.arya.casa`

Author

Writes independent longform essays spanning philosophy, environment, and culture:

- *Homo Subterraneous* — argues for underground urbanism as an ecological and civilizational strategy.
- *The Malleable Man* — a philosophical case for deliberately adopting non-falsifiable beliefs as a tool for growth.
- *On Travel* — empirical and philosophical reflections on place, belonging, and globalization.
- *Appreciate Beauty* — a life philosophy of cultivating active appreciation for the interconnected histories woven into existence.

Selected Side Projects (github.com/aryakaul)

labrats

Python

Open-source preprint-triage tool: a configurable team of LLM personas independently score new bioRxiv/arXiv abstracts on rigor, novelty, and relevance.

AGENTS

Shell, Markdown

Portable five-file scaffold for agentic-coding onboarding; the standard kit I use to spin up new projects with Claude Code.

rusty-krab-manager 327+ ⋆

Rust

Terminal-UI Pomodoro task manager with weighted scheduling; most-starred project on my GitHub.

boston-alleys

Python, Leaflet

Interactive web map of every public and private alley in Boston, progressively scored as I walk them.

Awards & Honors

Asimov Press / Works in Progress Writing Fellowship *2025*

Selected as a 2025 Writing Fellow to produce monthly longform articles on scientific and technological progress under expert editorial mentorship.

Harvard President's Building Bridges Fund *Spring 2024*

Awarded for *Policy Bridges*, a multi-session initiative fostering values-based dialogue across ideological divides on climate, technology, and health policy.

Chateaubriand STEM Fellowship *2023 – 2024*

Competitive Franco-American fellowship supporting 6 months of doctoral research at Inria's GenScale lab in Rennes, France with Dr. Karel Brinda.

NSF Graduate Research Fellowship Program — Honorable Mention *2021*

Halıcıoğlu Data Science Institute Undergraduate Fellowship *2019*

Awarded for proposed research on the role of extrachromosomal DNA in cancer prognosis with Dr. Vineet Bafna.