

NANDITA R. GARUD

Department of Ecology and Evolutionary Biology
University of California, Los Angeles
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Curriculum Vitae

September 2023

Research Interests: Evolutionary genomics in natural populations with a current emphasis on microbiomes; population genetics; bioinformatics.

EDUCATION

- 2015** **Ph.D. in Genetics**
Stanford University, Stanford, CA
Focus on adaptation in natural populations
- 2012** **MS in Statistics**
Stanford University, Stanford, CA
- 2008** **BS in Biometry & Statistics and Biological Sciences, (Magna Cum Laude)**
Cornell University, Ithaca, NY

EMPLOYMENT

- 2019- current **Assistant Professor**
University of California, Los Angeles, CA
Department of Ecology and Evolutionary Biology
Department of Human Genetics
Member, Interdepartmental Program in Bioinformatics
Member, Genetics & Genomics Home Area
- 2015-2019 **Bioinformatics Fellow**
Postdoctoral Position
The Gladstone Institutes at the University of California, San Francisco, CA
Advisor: Katherine Pollard
- 2015 summer **Data Scientist Intern**
Intuit Inc., Mountain View, CA

PREVIOUS RESEARCH

- 2010-2015 **Ph.D. Candidate**
Department of Genetics, Stanford University, Stanford, CA
Advisor: Dmitri Petrov

- 2008-2009 **Fulbright Scholar**
The Bioinformatics Centre, University of Copenhagen, Denmark
Advisor: Jakob Pedersen
- 2006-2008 **Undergraduate Honors Researcher**
Department of Molecular Biology and Genetics, Cornell University, Ithaca, NY
Advisor: Andrew Clark
- 2006 **Cold Spring Harbor Summer Undergraduate Research Intern**
Cold Spring Harbor, NY
Advisor: Doreen Ware

HONORS

- 2023 NSF CAREER recipient
- 2021- 2023 Scialog! Microbiome Neurobiology and Disease fellow
- 2021 University of California Hellman fellow
- 2020- Present Paul Allen Distinguished Investigator
- 2018 Genetics Society of America DeLill Nasser Award
- 2017 Gladstone Institutes Career Advancement Award
- 2014-2015 Stanford Center for Evolution and Human Genomics Fellow
- 2013 Walter Fitch Finalist, SMBE, Chicago
- 2010–2013 National Science Foundation Graduate Research Fellow
- 2008–2009 Fulbright Scholar, Copenhagen, Denmark

Other Experience and Professional Memberships:

Grant Review Membership:

- 2019, 2021 Ad hoc grant reviewer for the National Science Foundation
- 2021 Ad hoc grant reviewer for the French National Research Agency
- 2020 Ad hoc grant panelist for the National Science Foundation
- 2020 Ad hoc grant reviewer for the Army Research Office
- 2022 Ad hoc member of Population-based Research in Infectious Disease review panel, NIH
- 2023 Ad hoc member of ZMH1 ERB-M (04) S, NIMH Pathway to Independence Awards (K99/R00)
- 2023 Ad hoc reviewer for the European Research Council

Editorial Activities:

- 2020-Present Editor for the journal mSystems
- 2013-Present Referee for *Nature*, *Science*, *eLife*, *Nature Biotechnology*, *Cell Host & Microbe*, *PLoS Genetics*, *PLoS Biology*, *Nature Ecology and Evolution*, *Nature Communications*, *Genetics*, *Molecular Biology and Evolution*, *Molecular Ecology*, *Genome Biology and Evolution*, *Journal of Molecular Evolution*, *Current Biology*, *PLoS One*, *F1000*, *GigaScience*, *Nature Hereditary*, *Nucleic Acid Research*, *Nature Genetics*.

PUBLICATIONS

* denotes equal contributors.

Peer reviewed primary research:

1. Radaic A., Shamir E.R., Jones K., Villa A, **Garud NR**, Tward AD, Kamarajan P, Kapila YL. Bacteroidetes Are Associated with Distinct Sites When Moving from Healthy Mucosa to Oral Dysplasia—A Microbiome and Gene Profiling Study and Focused Review. *Microorganisms* (2023).
2. Wolff R., Shoemaker W.R., and **Garud NR**. Ecological stability emerges at the level of strains in the human gut microbiome. *mBio* (2023).
3. Harris M. and **Garud NR** “Enrichment of hard sweeps on the X chromosome of *Drosophila melanogaster*.” *Molecular Biology and Evolution* (2023).
4. Madi M, Chen D, Wolff R, Shapiro JB*, **Garud NR***. “Community diversity is associated with intra-species genetic diversity and gene loss in the human gut microbiome.” *eLife* (2023).
5. Briscoe L., Halperin E., and **Garud NR** “Microbiome source tracking using single nucleotide variants.” *Genome Biology* (2023).
6. Chen D.W. and **Garud NR** “Rapid evolution and strain turnover in the infant gut microbiome.” *Genome Research* (2022).
7. Briscoe L, Balliu B, Sankararaman S, Halperin E, **Garud NR**. “Evaluating supervised and unsupervised background noise correction in human gut microbiome data.” *PLoS Comp. Bio* (2022).
8. Singh G., Haileselassie Y., Briscoe L., Bai L, Patel A, Sanjines E, Hendler S, Singh P, **Garud NR**, Limketkai BN, Habtezion A. “The effect of gastric acid suppression on probiotic colonization in a double blinded randomized clinical trial.” *Clinical Nutrition ESPEN* (2021).
9. **Garud NR**, Messer P, Petrov D. “Detection of hard and soft sweeps from *Drosophila melanogaster* population genomic data.” *PLoS Genetics* (2021).
10. Roodgar M*, Good BH*, **Garud NR**, Martis S, Avula S, Zhou W, Lancaster S, Hayan Lee, Babveyh A, Nesamoney S, Pollard KS, Snyder MP. “Longitudinal linked read sequencing reveals ecological and evolutionary responses of a human gut microbiome during antibiotic treatment.” *Genome Research* (2021).
11. Harpak A, **Garud NR**, Rosenberg NA, Petrov DA, Combs M, Pennings PS, Munshi-South J. “Genetic adaptation in New York City rats.” *GBE* (2020).
12. **Garud NR***, Good BH*, Hallatschek O, Pollard KS. “Evolutionary dynamics of bacteria in the gut microbiome within and across hosts.” *PLoS Biology* (2019).
13. Harris, AM, **Garud NR**, DeGiorgio M. “Detection and classification of hard and soft sweeps from unphased genotypes by multilocus genotype identity.” *Genetics* (2018).
14. Battlay, P, Leblanc P, Green L, **Garud NR**, Schmidt J, Fournier-Level A, Robin C, “Structural variants and selective sweep foci contribute to insecticide resistance in the *Drosophila melanogaster* genetic reference panel.” *G3* (2018).

15. Nayfach S, Rodriguez-Mueller B, **Garud NR**, Pollard KS. “An integrated metagenomics pipeline for strain profiling reveals novel patterns of bacterial transmission and biogeography.” *Genome Research* (2016).
16. **Garud NR** and Petrov DA. “Elevated linkage disequilibrium and signatures of soft sweeps are common in *Drosophila melanogaster*.” *Genetics* (2016).
17. **Garud NR** and Rosenberg NA. “Enhancing the mathematical properties of haplotype homozygosity statistics for the detection of soft selective sweeps.” *Theoretical Population Biology* (2015).
18. **Garud NR**, Messer P, Buzbas E, and Petrov D. “Recent selective sweeps in North American *Drosophila melanogaster* show signatures of soft sweeps.” *PLoS Genetics* 11: e1005004 (2015).
19. McCoy RC, **Garud NR**, Kelley JL, Boggs CL, and Petrov DA. “Genomic inference accurately predicts the timing and severity of a recent bottleneck in a non-model insect population.” *Molecular Ecology* (2013).
20. Molina J, Sikora M, **Garud NR**, Flowers J, Rubinstein S, Reynolds A, Huang P et al. "Molecular evidence for a single evolutionary origin of domesticated rice." *Proceedings of the National Academy of Sciences* 108, no. 20 (2011): 8351-8356.

Peer reviewed reviews and opinion pieces:

21. **Garud NR**. “Understanding soft sweeps: a signature of rapid adaptation” *Nature Review Genetics* (2023)
22. **Garud NR**. “Microbial Evolution: An overlooked biomarker of host diet.” *Cell Host and Microbe* (2022).
23. **Garud NR**. “The Tempo and Mode of Adaptation in a Complex Natural Population: the Microbiome.” *mSystems* (2021).
24. Shoemaker W, Chen D, **Garud NR**. “Comparative population genetics in the human gut microbiome.” *GBE* (2021).
25. **Garud NR** and Pollard KS. “Population genetics in the microbiome.” *Trends in Genetics* (2019).
26. Wilson BA*, **Garud NR***, Feder AF*, Assaf ZJ*, and Pennings PS. “The population genetics of drug resistance evolution in natural populations of viral, bacterial and eukaryotic pathogens.” *Molecular Ecology* (2015). *equal contributors.

Preprints

27. Pandey D*, Harris M*, **Garud NR****, Narasimhan VM** Understanding natural selection in Holocene Europe using multi-locus genotype identity scans. *bioRxiv* (2023).
28. Harris M, Kim B, **Garud NR**, Enrichment of hard sweeps on the X chromosome compared to autosomes in six *Drosophila* species. *bioRxiv* (2023).

ONGOING RESEARCH SUPPORT

NIH R35 MIRA **\$1.78M total,** **08/01/2023-07/31/2028**
\$1.25M direct

Evolutionary Dynamics of the Human Gut Microbiome During Colonization

NSF CAREER **\$916K total, \$** **1/17/2023-12/31/2027**
656K direct

Parallel evolution in the microbiome: novel methods for detecting repeated, rapid adaptations in metagenomic data

Paul G. Allen Frontiers Group **\$1.5M total, \$300K to** **11/01/2020-12/31/2023**
my group direct

Distinct immune-metabolic niches in inflammatory bowel disease

***In kind* UCLA support for microbiome** **\$10K** **07/01/2023-01/15/2024**
sequencing

Understanding the evolutionary dynamics of gut microbiota in Alzheimer's Disease.

COMPLETED RESEARCH SUPPORT

Scialog: Microbiome, Neurobiology and **\$50K** **07/01/2021-06/30/2023**
Disease

Do aging microbiomes evolve pathogenicity via gene shedding? Using evolutionary theory to deconstruct microbiome-based neurodegeneration

UCLA Faculty Research grant **\$6.8K** **07/01/2020-06/30/2022**
Tracking the genetic content of microbiota in a stream

University of California Hellman award **\$25K** **07/01/2021-06/30/2022**
Uncovering the landscape of mutations in the human gut microbiome

UCLA Faculty Career Development award **\$15K** **07/01/2021-09/14/2022**
The evolutionary dynamics of gut microbiota in infants

TEACHING

Winter 2023	EEB 172/c202: Advanced Statistics
Fall 2022	EEB 297: Microbiome Evolutionary Genomics
Winter 2022	EEB 172/c202: Advanced Statistics
Fall 2021	EEB 297: Microbiome Evolutionary Genomics
Spring 2021	EEB 149: Evolutionary Genomics
Winter 2021	EEB 172/c202: Advanced Statistics
Fall 2020	EEB 297: Population Genomics Simulations with SLiM
Spring 2020	C234: Ethics and Accountability in Biomedical Research
Spring 2020	CM222: Algorithms in Bioinformatics
Winter 2020	EEB 172/c202: Advanced Statistics
Fall 2019	EEB 297: Recombination in Bacteria Graduate Seminar

Feb. 2020	Guest lecturer for EEB 250: Tools for First Year Graduate students
Nov 2019	Guest lecturer for EEB course on 'How to Obtain a Job'
Oct. 2019	Guest lecturer for CS 184: Bioinformatics and Systems Biology Undergrad seminar.
May 2019	Guest lecturer for Population Genetics undergraduate course at UCLA
Jan. 2019	Guest lecturer for Introduction to Microbiology undergraduate course at UCLA
Fall 2016	Guest lecturer for Computing in Biology, San Francisco State University
2012-2014	Splash! (Stanford Educational Studies Program) course on introductory population genetics to high school students.
Fall 2013	Teaching assistant for Bio-explorations course at Stanford for freshmen undergrads
Spring 2012	Teaching assistant for the PhD level Genomics course at Stanford

UNIVERSITY AND DEPARTMENTAL SERVICE:

2023	Member of organizing committee for the Ecology and Evolutionary Biology annual research symposium
2023	Ecology and Evolutionary Biology Department Awards Committee member
2022-2023	Undergraduate curriculum course change adviser
2020-2023	Undergraduate Curriculum committee member, Department of Ecology and Evolutionary Biology
2021-2022	Search committee member for the Department of Ecology and Evolutionary Biology CAO position
2021	Reviewer for UCLA's Cota Robles fellowship applications
2021	Ad Hoc faculty search committee member
2020-2021	Mentor Professor Faculty Search committee member
2020	Graduate student award committee member: Department of Ecology and Evolutionary Biology at UCLA
2019	PhD admissions committee member: Department of Ecology and Evolutionary Biology at UCLA
2019-Present	PhD admissions committee member: Bioinformatics graduate program at UCLA
2019	PhD admissions committee member: Department of Human Genetics at UCLA
2019-2022	Computational and Systems Biology committee member at UCLA

OTHER PROFESSIONAL ACTIVITIES:

2022	External examiner for Australian National University MS thesis
2021	Moderator for the 27 th annual Boston Bacterial Meeting
2021	Organizer of the "Evolutionary Genetics in Natural Microbial Populations" symposium at the Society for Molecular Biology and Evolution annual meeting.
2020	University of Southern California guest visitor for Women in Science group
2019-current	Mentor for Bruins in Genomics at UCLA undergraduate research students
2019	Encountering the Unseen: collaboration with break dancers to depict my paper on the evolutionary dynamics of bacteria in the microbiome at UCLA
2017	Organizer of Society for Molecular Biology and Evolution symposium on 'Probing microbiome dynamics'
2016	Organizer of the UCSF OUT in Science panel discussion
2014	Poster presentation judge at the Society for Molecular Biology and Evolution
2014	Seminar Organizer for the Stanford Center for Evolution and Human Genomics
2012	Created a \$30,000 per year fund with the Stanford School of Medicine for travel grants

- for conferences for all Bioscience PhD students.
- 2011 Organizer of the Biomedical Computation at Stanford (BCATS) Conference
- 2011 Consultant for the Stanford Statistical Consulting group

MENTORING

Graduate students and postdocs:

- 2022-current Peter Laurin (PhD student in Ecology and Evolutionary Biology)
Michael Wasney (PhD student in Human Genetics)
Aina Martinez i Zurita (PhD student in Human Genetics)
- 2021-current Jonathan Mah (PhD student, Bioinformatics, co-advised with Prof. Kirk Lohmueller and supported by an SIB NIH training grant)
- 2020-current William Shoemaker (NSF Postdoctoral Fellow). Currently a postdoc at the Abdus Salam International Centre for Theoretical Physics
Mariana Harris (PhD student, Math Bio program, supported by SIB and GATP NIH training grants)
- 2019-current Richard Wolff (PhD student, Ecology and Evolutionary Biology)
- 2019-2023 Leah Briscoe (PhD student, Bioinformatics; Joint with Eran Halperin, supported by an NSF graduate research fellowship), defended. Currently employed at Bayer.

Graduate rotation students

- 2021 Alejandro Espinoza (PhD rotation student, Genetics and Genomics. Cota Robles fellow).
- 2020 Albert Xue (PhD rotation student, Bioinformatics)
Nicole Zeltser (PhD rotation student, Genetics)
Helen Huang (PhD rotation student, Bioinformatics)

Undergraduate students:

- 2023 Radha Ganesh (Bruins in Genomics summer student)
Joeun Jeon (Bruins in Genomics summer student)
- 2022 Julianna Perez (Bruins in Genomics summer student)
Kaysa Pfannmuller (Bruins in Genomics summer student)
- 2022-current Brian Roysar (BS student, Computer Science and Math)
- 2021-2022 Brock Karas (BS student, Ecology and Evolutionary Biology)
Sarah Bald (BS student, Bruins in Genomics summer student) (currently a PhD student at Boston University)
- 2020-current Rahul Natrajan (BS student, Computer Science) (Currently an MS student at Columbia University)
Nada AbouHaiba (BS student) (currently a medical student at the Mayo Clinic)
Henry Krasner (BS student) (currently a medical student at University of Nevada)
- 2021 Melody Zhang (BS student)
Maggie Yu (BS student)
Samantha Chung (BS student)
Anna McDonald (BS student, Bruins in Genomics summer student)
Ashwin Deena (BS student, CASB)
Alejandro Espinoza (PhD rotation student, Genetics and Genomics. Cota Robles fellow).
- 2020 Shavonna Jackson (BS student, Bruins in Genomics)
Etan Dieppa (BS student, Bruins in Genomics)
Kevin Delao (BS student, Bruins in Genomics)
Maya Singh (BS student, Bruins in Genomics)

	Anshuman Mahalley (BS student, Computer Science)
2019	Daisy Chen (BS student, Computer Science) (currently a PhD student at UCSD) Sara Thornburgh (BS student, Ecology and Evolutionary Biology) Sara Makanani (MS student, Ecology and Evolutionary Biology)
2017-2019	Annamarie Bustion (PhD student, UCSF, under Katherine Pollard's supervision)
2017-2019	Katherine Zhang (HS student). Project won semi finalist position at the National Siemens Westinghouse Competition. (Currently an undergraduate student at Harvard)
2016	Haleigh Miller (Summer Undergraduate, Foothill College).

GRADUATE COMMITTEES

PhD Committee member for:

Celine Snedden, 2022-Present (Ecology and Evolutionary Biology)
Alejandra Gamboa 2021-Present (Ecology and Evolutionary Biology)
Liat Shenov, 2019-2020 (Computer Science)
Rosa McGuire 2020-Present (Ecology and Evolutionary Biology)
Chris Kyriazis, 2020-2022 (Ecology and Evolutionary Biology)
Natalie Lozano, 2020-2022 (Ecology and Evolutionary Biology)
Jesse Garcia, 2020-2022 (Ecology and Evolutionary Biology)
Riley Mummah 2020-2022 (Ecology and Evolutionary Biology)
Tina Del Carpio 2020-Present (Ecology and Evolutionary Biology)
Serena Huang 2020-Present (Genetics and Genomics)
Eva Horna Lowell 2020-2022 (Ecology and Evolutionary Biology)

PhD Guidance Committee member for:

Austin Betancourt (Ecology and Evolutionary Biology)
Heidi Yang (Ecology and Evolutionary Biology)
Eva Horna Lowell (Ecology and Evolutionary Biology)
Albert Chung (Ecology and Evolutionary Biology)
Daniel Littman (Bioinformatics)

MS Committee member for:

Evelyn Malmut (Ecology and Evolutionary Biology)
Philip Lee (Bioinformatics)
Davis Mai (Ecology and Evolutionary Biology)
April Zhou (Ecology and Evolutionary Biology)
Shaili Mathur (Computational and Systems Biology)
Emoni Cook (Ecology and Evolutionary Biology)

INVITED PRESENTATIONS SEMINARS

1. July 2023 Computational Genomics Summer Institute, UCLA
2. July 2023 San Francisco State University EEB BIPOC seminar series
3. June 2023 McGill University: Adaptation in Structured Populations Symposium
4. May 2023 QCBio Career Development Seminar, UCLA
5. May 2023 Cedars Sinai Computational Biomedicine Grand Rounds Seminar
6. April 2023 Paul Allen Annual Meeting – presentation on diversity along the gut
7. March 2023 Cornell Institute of Host-Microbe Interactions and Disease Seminar
8. Dec. 2022 Keystone Conference: The Human Microbiome: Ecology and Evolution. Banff, Canada
9. Nov. 2022 Stanford Center for Human Genetics Seminar

10. Oct. 2022 NHLBI: Role of the Microbiome in Heart, Lung, Blood and Sleep Disorders workshop
11. Oct. 2022 University of Georgia Departmental Seminar
12. July 2022 University of California, Los Angeles, QCBIO seminar series
13. May 2022 Keynote speaker at RECOMB satellite meetings
14. May 2022 Cedars Sinai Seminar
15. May 2022 University of Arizona Department Seminar
16. Apr. 2022 SoCal Systems Biology Meeting
17. Apr. 2022 University of Manchester Department Seminar
18. Oct. 2021 Institute for Systems Biology, Seattle WA, Virtual Microbiome Series
19. Oct. 2021 Cornell University Department Seminar
20. Oct. 2021 Columbia University Department Seminar
21. Sept. 2021 Universidad Nacional Autónoma de México Departmental Seminar
22. June 2021 American Society for Microbiology talk
23. May 2021 University of British Columbia Department Seminar
24. May 2021 UC Berkeley CTEG seminar
25. April 2021 UC Irvine Department Seminar
26. April 2021 McGill Department Seminar
27. Mar. 2021 Paul Allen Institute
28. Feb. 2021 Gulbenkian Institute in Portugal, Seminar
29. Jan. 2021 UCSF Microbiome Center Symposium
30. Nov. 2020 University of Vienna Departmental Seminar
31. Oct. 2020 UC Davis EEB Departmental Seminar
32. Oct. 2020 Penn State University Departmental Seminar
33. Aug. 2020 Emory University Microbiome Seminar
34. June 2020 World Microbiome Day Seminar, Vanderbilt University
35. Jan. 2020 Microbiome Population Genetics, Chan Zuckerberg Institute
36. Jan. 2020 Emerging Opportunities for Mathematics in the Microbiome, Institute for Pure and Applied Mathematics at UCLA
37. Dec. 2019 Deciphering Microbiomes at the National Science Foundation, DC
38. Sept. 2019 Keynote speaker for the Institute for Quantitative and Computational Biosciences
39. Sept. 2019 Department of Human Genetics at UCLA Seminar
40. Sept. 2019 University of Southern California Departmental Seminar
41. Sept. 2019 UCLA Anesthesiology Grand Rounds
42. Aug. 2019 University of Minnesota Microbial and Plant Genomics Institute Symposium
43. July 2019 UCLA Computational Genomics Summer Institute
44. June 2019 American Society for Microbiology: *Plenary Session*
45. Jan. 2019 UCLA Behavior, Evolution, and Culture speaker series
46. March 2018 University of Pennsylvania Biology Departmental Seminar
47. Feb. 2018 New York Genome Center Departmental Seminar
48. Feb. 2018 Temple University iGEM Departmental Seminar
49. Jan. 2018 UCLA Ecology and Evolutionary Biology Departmental Seminar
50. Dec. 2013 Penn State University, Department of Biology

SELECT CONFERENCE PRESENTATIONS AND OTHER SEMINARS:

1. Oct. 2019 Southern CALifornia Evolutionary Genetics & Genomics (SCALE) meeting, University of California, Irvine
2. Oct. 2018 Microbial Ecology and Evolution meeting in Lisbon, Portugal
3. Sept. 2018 Lake Arrowhead Microbial Genetics

4. Jan. 2018 New York Area Population Genetics meeting
5. Nov. 2017 Bay Area Population Genetics meeting
6. April 2017 California Academy of Sciences
7. July 2015 Society for Molecular Biology and Evolution
8. Nov. 2014 Stanford Genetics Department
9. June 2014 Society for Molecular Biology and Evolution
10. Jan. 2014 Biomedical Computation at Stanford
11. July 2013 Walter Fitch Symposium, Society for Molecular Biology and Evolution
12. April 2013 Drosophila Research Conference
13. April 2013 Stanford Genome Training Program retreat
14. Jan. 2013 Bay Area Population Genetics meeting

Conference travel awards

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| 2018 | Eco-Evo travel award to the Gulbenkian, Portugal |
| 2018 | Genetics Society of America DeLill Nasser Award |
| 2017 | Gladstone Institutes Career Advancement Award |
| 2015 | SMBE in Vienna Young Investigator Travel Award |
| 2014 | Stanford BioX travel grant to the SMBE conference in Puerto Rico |
| 2013 | SMBE travel grant to the SMBE conference in Chicago |
| 2013 | Stanford BioX travel grant to the Drosophila conference in Washington DC |
| 2013 | Stanford School of Medicine travel grant to the Drosophila conference in Washington DC |
| 2012 | Stanford Department of Biology travel grant to the SMBE conference in Ireland |
| 2011 | National Science Foundation travel award to the SMBE conference in Kyoto, Japan |