

Adam Rosenthal

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Education and Relevant Work Experience

DuPont Biosciences (now part of IFF), Wilmington Delaware Senior Principal Investigator - Project leader (Human Microbiome Initiative)	2018 - Present
Calico Labs LLC (California Life Company – a Google company), S. San Francisco Principal Investigator – Group Leader	2015 - 2017
California Institute of Technology, Pasadena Postdoctoral Fellow – Michael Elowitz & Jared Leadbetter labs Bio & Bio Eng.	2008 - 2015
University of California, Los Angeles Ph.D. –Molecular Biology Jay Gralla lab	2003 - 2008
California State Polytechnic University Pomona M.S. - Biology	2000 - 2003
University of California, Santa Cruz B.A. - Biology	1997 - 1999

Research Appointments

DuPont Biosciences (now part of IFF)

- Promoted to lead a multi-team initiative in the DuPont Human Microbiome Initiative (2019)
- Heading a 5-person research lab focused on gut inflammation and a BSL2 human pathogen
- Developing products that modulate the microbiome and increase fermentation throughput
- Produced patents and published scientific papers
- Established and leading a collaboration to develop methods with Harvard Medical School labs to adapt single cell tools (omics and microscopy) to study microbe-microbe interactions *in situ*

Calico Labs LLC (California Life Company – a Google company)

- Established and headed an independent lab focused on cell-cell interactions in aging organs
- Developed microfluidic single-cell tools and protocols for interrogation of mammalian organs
- Lead a large single-cell cell animal study identifying cells susceptible to aging and revealing previously unknown stereotypic age-related phenomena –published in Genome Research

California Institute of Technology, Pasadena (Postdoc: Michael Elowitz and Jared Leadbetter labs)

- Lead author of multiple manuscripts in high impact journals (PNAS, eLife, ISME, others)
- Awarded Caltech Fellowship and grant for pioneering work in single-cell analysis
- Trained and supervised three graduate and two undergraduate students
- Collaborated with multiple Caltech labs to develop new molecular and systems biology methods to study individual microbes within their natural environment
- Identified and characterized mechanisms of symbioses in a gut microbiome ecosystem (termite)

University of California, Los Angeles (PhD: Jay Gralla lab)

- Primary author of four articles published in high impact journals (JMB, Mol Micro, others)
- Applied biochemical, genetic, and microbiology tools to determine properties of microbial enzymes
- characterized a previously unknown mechanism in the Sigma38 (RpoS) sigma factor in *E. coli*
- Presented research findings to colleagues at seminars and national meetings
- Supervised 2 graduate and 3 undergraduate students

Teaching Appointments (listed in order of scope)

Adjunct Faculty (Lecturer) - CSPU Pomona (2009-2011)

- Independently taught three different lecture courses in Genetics and Microbiology (major and general elective courses)
- Effectively instructed classes of 50-100 students as an independent lecturer
- Successfully redesigned a full lecture course in non-major introductory microbiology
- Rated outstanding (above departmental average) in both student and department surveys

Teaching Assistant - Santa Barbara Advanced School of Quantitative Biology UCSB KITP (2014)

- TA for the KITP advanced course for quantitative biology (summer intensive research course)
- Directed independent research projects lead by course students (PhD students)
- Helped students design, conduct, and analyze time-lapse microscopy of bacterial cultures

Teaching Assistant - Caltech Bioinformatic Bootcamp (2013)

- Teaching Assistant for a weeklong intensive bioinformatics course
- Taught aspects of RNA-seq analysis and informatics pipeline

Teaching Assistant - UCLA (2004-05)

- TA for lab courses microbiology
- Rated as a highly effective teaching associate in student surveys

Teaching Assistant - CSPU Pomona (2000-03)

- TA for lab and lecture courses in immunology, microbiology, and general biology
- Rated as a highly effective teaching associate in student surveys

Publications

- 1) Brennan MA and **Rosenthal AZ*** (2021) Single Cell RNA Sequencing Elucidates the Structure and Organization of Microbial Communities *Frontiers in Microbiology (Perspective)*
*Corresponding author
- 2) McNulty RA, Sritharan D, Liu S, Hormoz S * and **Rosenthal AZ*** (2021) Droplet-based single cell RNA sequencing of bacteria identifies known and previously unseen cellular states bioRxiv
<https://www.biorxiv.org/content/10.1101/2021.03.10.434868v1.article-metrics>
*Corresponding author
- 3) Kimmel JC, Penland L, Rubinstein ND, Hendrickson DG, Kelley DR* and **Rosenthal AZ*** (2019) Murine single-cell RNAseq reveals cell-identity- & tissue-specific trajectories of aging *Genome Research*
*Corresponding author
- 4) **Rosenthal AZ**, , Yutao Qi, Sahand Hormoz, Jin Park, Sophia Hsin-Jung Li, and Michael Elowitz. (2018) Metabolic interactions between dynamic bacterial subpopulations *eLife*
- Highlighted - News and Views by Martin Ackermann and co-workers
- Selected as "Paper of the Month" by the Bacillus subtilis community (SubtiWiki)
- 5) Choi HM, Calvert CR, Husain N, Huss D, Barsi JC, Deverman BE, Hunter RC, Kato M, Lee SM, Abelin AC, **Rosenthal AZ**, et al. (2016) Mapping a multiplexed zoo of mRNA expression *Development*
- 6) McIsaac R.S., Engqvist M.K.M, Wannier T., **Rosenthal A.Z.**, Herwig L.... and Arnold F.H. (2014) Directed evolution of a far-red fluorescent rhodopsin *PNAS*
- 7) Matson E.G. *, **Rosenthal A.Z.***, Zhang X, and Leadbetter, J.R. (2013) Genome-wide effects of selenium and translational uncoupling on transcription in the termite gut symbiont *T. primita*. *mBio*

*Equal contribution, co-corresponding authors

- 8) **Rosenthal A.Z.***, Zhang X.*, Lucey K.S., Ottesen E.A., Trivedi V., Choi H.M.T., Pierce N.A., and Leadbetter, J. (2013) Localizing transcripts to single cells suggests an important role of uncultured deltaproteobacteria in the termite gut hydrogen economy *PNAS*
- Faculty of 1000 recommended *Equal contribution
- 9) **Rosenthal A.Z.** and Elowitz M.B. (2011) Following evolution of bacterial antibiotic resistance in real time *Nature Genetics (News and Views)*
- 10) **Rosenthal A.Z.**, Matson E.G., Eldar A, and Leadbetter, J.R. (2011) Transcript sequencing of co-cultured termite gut bacteria reveals a multifaceted symbiosis. *ISME Journal*
- 11) **Rosenthal, A.Z.*** Kim, Y.B.*, and Gralla, J.D. (2008) Regulation of transcription by acetate in *E. coli*: *in vivo* and *in vitro* comparisons. *Molecular Microbiology*
- 12) **Rosenthal, A.Z.**, Kim, Y.B., and Gralla, J.D. (2008) Poising of bacterial RNA polymerase by the $\sigma 38$ C-Terminal tail and its release for osmotic transcription. *Journal of Molecular Biology*
- 13) **Rosenthal, A.Z.**, Hu, M., and Gralla, J.D. (2006) Osmolyte-induced transcription: -35 region elements and recognition by $\sigma 38$ (rpoS). *Molecular Microbiology*
- Faculty of 1000 recommended
- 14) Huo, Y.X., **Rosenthal A.Z.**, Gralla J.D. (2008) General stress response signaling: unwrapping transcription complexes by DNA relaxation via the sigma38 CTD. *Molecular Microbiology*
- Faculty of 1000 recommended
- 15) Sorensen, O.E., Thapa, D.R., **Rosenthal A.**, Lu L., Robertson AA., Ganz T. (2005) Differential regulation of beta-defensin expression in human skin by microbial stimuli. *Journal of Immunology*

Book Sections

- Altendorf, K., I. R. Booth, J. Gralla, J.-C. Greie, **A. Z. Rosenthal**, and J. M. Wood. (2009) Chapter 5.4.5, Osmotic Stress. In A. Böck, R. Curtiss III, J. B. Kaper, P. D. Karp, F. C. Neidhardt, T. Nyström, J. M. Slauch, C. L. Squires, and D. Ussery (ed.), *EcoSal—Escherichia coli and Salmonella: cellular and molecular biology*. <http://www.ecosal.org>. ASM Press, Washington, DC.

Selected Invited Talks

- 1) New bacterial single cell RNA sequencing tools uncover heterogeneity and reveal community structure and function. Princeton University Bioengineering Dept. special seminar May 2021
- 2) Single cell tools for discovering structure in bacterial populations. Peking University quantitative biology institute Nov. 2020
- 3) Using single cell tools to understand how cellular communities are organized. UNLV, Las Vegas NV. March 2020
- 4) Identifying and characterizing important members of bacterial communities. DuPont, Wilmington DE. May 2018
- 5) Cell-cell heterogeneity reveals interactions between cell-types and organisms. Calico Labs, South San Francisco, CA. May 2015
- 6) Using single-cell data to understand the physiological function of different cell-types and organisms. California State University, Pomona. Pomona, CA April 2015
- 7) The role of metabolic specialization and its effect on biological robustness. DARPA Bio-BRICS program planning meeting. Boston, MA. May 2013
- 8) New Insights into Hindgut Microbial Communities Suggest an Important Role for an Uncultured Organism. 1st annual CEMI Symposium, California Institute of Technology, Pasadena, CA. Nov. 2013

- 9) Lessons from Transcriptional Studies of a Mixed Bacterial Culture
California State University, San Marcos. San Marcos, CA. March 2011
- 10) Symbiotic Interactions of Wood Degrading Termite Gut Microbes
California State University, Northridge. Northridge, CA. February 2011
- 11) Post-genomic Insights into Wood Degradation by Termite Gut Microbes
Joint Science Dept. of Claremont McKenna, Pitzer & Scripps Colleges. Claremont, CA. Dec. 2010
- 12) Transcript Sequencing of Co-Cultured Termite Gut Bacteria Reveals a Multifaceted Symbiosis
UCLA MIMG Department. Los Angeles, CA. March 2010
- 13) Transcriptional response of *E. coli* to environmental stress,
Environmental Science and Engineering department, California Institute of Technology. May 2008

Fellowships, Honors, Patents, Recognition, and Other Achievements

- Dupont Science and Innovation project award (2019) – projects under my management were granted 900K from the internally peer-reviewed S&I program at Dupont (top 15% of all applications)
- Dupont Science and Innovation project award (2018) – projects under my management were granted 600K from the internally peer-reviewed S&I program at Dupont (top 15% of all applications)
- Caltech Center of Environmental Microbial Interactions (CEMI) postdoctoral fellowship
- Caltech CEMI Pilot Grant (50,000) (2012-2013)
- UCLA Chancellor's recognition for academic excellence and student leadership (2008)
- UCLA Graduate Student Association Jeffrey L Hanson Distinguished Service Award (2008)
(Highest honor given to UCLA graduate students for contribution to student government)
- 2 Patents in filing process (Dupont microbiome)

Service and Leadership Experience

Guest Editor – Frontiers in Microbiology (special research topic – metabolic heterogeneity in bacteria)

- Invited to serve as editor for papers submitted to a special journal topic on metabolic heterogeneity

Student Representative: Academic Senate Graduate Council (GSA) (UCLA 2006-2008)

- Appointed as one of 4 UCLA graduate student representatives
- Represented graduate students in the Academic Senate, participated in graduate-program reviews

Vice-Chairperson: Board of Governors of the Student Activities Center

- Reviewed and managed budgetary operations of the center (annual budget \$280,000)
- Led, drafted and passed a resolution to construct a new student center at UCLA (completed 2010)

Member: Board of Governors of the John R. Wooden Center

- Reviewed and managed budgetary operations of the center (annual budget \$515,000)
- Collaborated with Associated Students – UCLA (ASUCLA) group to find an innovative budgetary solution to allow the building of a new multi-million dollar student facility (completed 2010)

Member: Graduate Student Resource Center Oversight Committee

- Organized and oversaw professional and recreational activities for graduate students

Peer-Reviewer for high-impact professional journals

- Independently reviewed multiple manuscripts in leading scientific journals

Mentorship and Contributions to Increasing Equity and Diversity

DuPont

- Mentored 7 research associates (technicians)
- Selected for leadership training and completed courses in project management and mentoring

Calico

- Mentored one technician and one scientist, co-mentor for an analyst and a Postdoctoral fellow
- Completed courses in mentorship, management and unconscious-bias
- Member of the Calico committee establishing unconscious bias training for the entire company

Caltech

- Trained and mentored three graduate students and two summer undergraduate students
- Volunteer mentor for student members of the MBRS-RISE program at a local minority-serving university (Minority Biomedical Research Support – NIH NIGMS initiative)

CSU-Pomona (instructor)

- Taught and mentored undergraduates in a minority serving local university
- Advised 3 minority students who went to graduate programs and several applicants for med- schools
- Volunteer counselor for the MBRS-RISE Minority Biomed Research program which provides aid and guidance to undergraduate minority students

UCLA

- Mentored 2 graduate and several undergraduate students. Advised 2 minority pre-med students who were subsequently accepted to medical schools (one as an MD/PhD candidate)
- As member of academic senate reviewed graduate programs to ensure mentorship is emphasized
- In Graduate Student government worked for LGBTQ rights to designate gender-neutral restrooms

References

Michael Elowitz (Postdoctoral Mentor)

Professor of Biology & Bioengineering, HHMI Investigator, California Institute of Technology
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Jared Leadbetter (Postdoctoral Mentor)

Professor of Biology & Environmental Science and Engineering, California Institute of Technology
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Sahand Hormoz (Collaborator)

Assistant Professor of Systems Biology, Harvard Medical School
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Pierre Rouviere (Department head – Dupont, retired)

Leader of Dupont Microbiology competency (retired)
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Tanja Gruber (Department head – Dupont/IFF microbiology)

Leader of IFF ESL microbiome department
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Jay Gralla (PhD Mentor)

Professor emeritus of Biochemistry and Molecular Biology, UCLA
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Daniel Gottschling (Head of Biology, Calico)

Head of research operations at Calico, member of the National Academy of Sciences
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