Adam Rosenthal, Ph.D.

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Education and Relevant Work Experience

DuPont-IFF, Wilmington Delaware — 2018 - Present
Senior Principal Investigator - Project leader (Human Microbiome Initiative)

Calico Labs LLC (California Life Company – a Google company), S. San Francisco — 2015 - 2017
Principal Investigator – Group Leader

California Institute of Technology, Pasadena — 2008 - 2015
Postdoctoral Fellow – Michael Elowitz & Jared Leadbetter labs Bio & Bio Eng.

University of California, Los Angeles — 2003 - 2008
Ph.D. –Molecular Biology Jay Gralla lab

California State Polytechnic University Pomona — 2000 - 2003
M.S. - Biology

University of California, Santa Cruz — 1997 - 1999
B.A. - Biology

Research Appointments

DuPont-IFF

- Promoted to lead a multi-team initiative in the DuPont Human Microbiome Initiative (2019)
- Heading a 4-person research lab focused on gut inflammation and a BSL2 human pathogen
- Developing products that modulate the microbiome and increase fermentation throughput
- 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 – now 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 microbiological tools to test properties of microbial enzymes
- Identified a previously unknown mechanism of action in the Sigma-38 (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)
- Taught three different 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) 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

2) 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

3) **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)

4) 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*

5) 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*

6) 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

7) **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

8) **Rosenthal A.Z.** and Elowitz M.B. (2011) Following evolution of bacterial antibiotic resistance in real time *Nature Genetics (News and Views)*

9) **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*

10) **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*

11) **Rosenthal, A.Z.**, Kim, Y.B., and Gralla, J.D. (2008) Poising of bacterial RNA polymerase by the σ38 C-Terminal tail and its release for osmotic transcription. *Journal of Molecular Biology*

12) **Rosenthal, A.Z.**, Hu, M., and Gralla, J.D. (2006) Osmolyte-induced transcription: -35 region elements and recognition by σ38 (rpoS). *Molecular Microbiology*
- Faculty of 1000 recommended

13) 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

14) 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) Single cell tools for discovering structure in bacterial populations. Peking University quantitative biology institute Nov. 2020

2) Using single cell tools to understand how cellular communities are organized. UNLV, Las Vegas NV. March 2020

3) Identifying and characterizing important members of bacterial communities. DuPont, Wilmington DE. May 2018

4) Cell-cell heterogeneity reveals interactions between cell-types and organisms. Calico Labs, South San Francisco, CA. May 2015

5) Using single-cell data to understand the physiological function of different cell-types and organisms. California State University, Pomona. Pomona, CA April 2015

6) The role of metabolic specialization and its effect on biological robustness. DARPA Bio-BRICS program planning meeting. Boston, MA. May 2013

7) 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

8) Lessons from Transcriptional Studies of a Mixed Bacterial Culture
California State University, San Marcos. San Marcos, CA. March 2011

9) Symbiotic Interactions of Wood Degrading Termite Gut Microbes
California State University, Northridge. Northridge, CA. February 2011

10) Post-genomic Insights into Wood Degradation by Termite Gut Microbes
Joint Science Dept. of Claremont McKenna, Pitzer & Scripps Colleges. Claremont, CA. Dec. 2010

11) Transcript Sequencing of Co-Cultured Termite Gut Bacteria Reveals a Multifaceted Symbiosis UCLA MIMG Department. Los Angeles, CA. March 2010

12) 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

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 5 research associates (technicians) – 2 are currently PhD students in R01 programs
- 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

UCLA

- Mentored 2 graduate and several undergraduate students. Advised 2 minority students who were accepted to medical school (one as an MD/PhD)
- 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
melowitz@caltech.edu (626) 395-8871

Jared Leadbetter (Postdoctoral Mentor)
Professor of Biology & Environmental Science and Engineering, California Institute of Technology
jleadbetter@caltech.edu (626) 395-4182

Jay Gralla (PhD Mentor)
Professor emeritus of Biochemistry and Molecular Biology, UCLA
gralla@mbi.ucla.edu (310) 825-1620

Sahand Hormoz (Collaborator)
Assistant Professor of Systems Biology, Harvard Medical School
sahand_hormoz@hms.harvard.edu (617) 959-3755

Pierre Rouviere (Department head – Dupont, retired)
Leader of Dupont Microbiology competency (retired)
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