Stanford



Rafael Rivera Lugo

Postdoctoral Scholar, Biology

Bio

BIO

Rafael Rivera-Lugo is a Stanford Science Fellow postdoctoral associate in the Department of Biology and the ChEM-H Institute at Stanford University, where he works in the laboratory of Christine Jacobs-Wagner. His postdoctoral research focuses on how the Lyme disease bacterium Borrelia burgdorferi establishes infection using novel mouse models to dissect the immune and cellular mechanisms that drive tissue pathology during infection. He is also developing metabolically active, non-replicating bacterial platforms for vaccine applications.

Rafael completed his Ph.D. in Molecular and Cell Biology at the University of California, Berkeley, in the laboratory of Daniel A. Portnoy. His doctoral work revealed how the intracellular pathogen Listeria monocytogenes acquires and utilizes flavins (riboflavin derivatives) during infection, reshaping our understanding of bacterial metabolism and immune evasion. This work produced multiple high-impact publications in journals including PNAS, eLife, Nature, and mBio, and was recognized with the Harold M. Weintraub Graduate Student Award and the Nicholas Cozzarelli Prize. He received his B.S. in Biology and Biotechnology, Summa Cum Laude, from the University of Puerto Rico at Ponce.

Beyond research, Rafael is deeply committed to expanding access to scientific careers. He has mentored students from historically underserved communities through programs at Stanford and UC Berkeley, co-founded organizations to support peers navigating academic science, and has been a consistent advocate for creating welcoming and rigorous scientific environments for all students.

HONORS AND AWARDS

- Invited Speaker, ImmunoDiverse Colloquia, University of California, San Francisco, University of California, San Francisco ImmunoDiverse (2026)
- Stanford Science Fellowship (competitive institutional fellowship), Stanford University (2024)
- Harold M. Weintraub Graduate Student Award, Fred Hutch Cancer Center (2023)
- Lyme Disease Association Medical Scholarship, Lyme Disease Association (2023)
- Nicholas Cozzarelli Prize for Best Ph.D. Research and Dissertation in Molecular and Cell Biology, University of California, Berkeley Molecular and Cell Biology (2023)
- Carl Storm Underrepresented Minority Travel Fellowship, Gordon Research Seminar on Microbial Toxins and Pathogenicity (2022)
- Invited Speaker, Gordon Research Seminar on Microbial Toxins and Pathogenicity, Gordon Conference on Microbial Toxins and Pathogenicity (2022)
- Honorable Mention, Ford Foundation Dissertation Fellowship, National Academies of Sciences, Engineering, and Medicine (2021)
- University of California Dissertation-Year Fellowship, University of California, Berkeley (2021)
- Carl Storm Underrepresented Minority Travel Fellowship, Gordon Conference on Microbial Toxins and Pathogenicity (2020)
- Outstanding Graduate Student Instructor Award, University of California, Berkeley (2020)

- Research Capstone Fellowship, American Society for Microbiology (2019)
- Ford Foundation Fellowship, National Academies of Sciences, Engineering, and Medicine (2018)
- The James A. Buchanan Scholarship, University of California, Berkeley (2017)
- Chancellor's Fellowship for Graduate Study, University of California, Berkeley (2016)
- Most Distinguished Biology Student, Class of 2016, University of Puerto Rico, Ponce (2016)
- Top Off Award, University of California, Berkeley (2016)
- Amgen Scholar, University of California, Berkeley (2015)
- Summer Research Opportunity Program Scholar, University of Michigan, Ann Arbor (2014)
- Best Poster Presentation Award, Annual Biomedical Research Conference for Minority Students (ABRCMS) (2013)
- Dean's List, Tuition Waiver (Top 5% GPA); Honors Program, University of Puerto Rico, Ponce (2012-2016)
- Western Region Puerto Rican Council Scholarship, Western Region Puerto Rican Council (2012)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Advisor, Laguna Biotherapeutics (2022 - present)

PROFESSIONAL EDUCATION

- Doctor of Philosophy, University of California, Berkeley , Molecular and Cell Biology (2022)
- Bachelor of Science, University of Puerto Rico, Ponce , Biology/Biotechnology (2016)

STANFORD ADVISORS

- Christine Jacobs-Wagner, Postdoctoral Faculty Sponsor

Publications

PUBLICATIONS

- **Avoidance of MAIT cells is an essential determinant of Listeria monocytogenes pathogenesis** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*

  Rivera-Lugo, R., Garcia Castillo, J., Lobanovska, M., Tang, E., Anaya-Sanchez, A., Espich, S., Stanley, S. A., DuPage, M., Portnoy, D. A.

  2026; 123 (24): e2601925123

- **Reprogramming Listeria monocytogenes flavin metabolism to improve its therapeutic safety profile and broaden innate T-cell activation** *MBIO*

  Chevee, V., Lobanovska, M., Rivera-Lugo, R., Guereca, L., Feng, Y., Anaya-Sanchez, A., Garcia Castillo, J., Huckins, A. M., Lemmens, E. E., Rae, C. S., Hardy, J. W., Carrington, R., Kotula, et al

  2025: e0365225

- **Mycobacterium tuberculosis triggers reduced inflammatory cytokine responses and virulence in mice lacking Tax1bp1** *PLOS PATHOGENS*

  Chin, J., Abeydeera, N., Repasy, T., Rivera-Lugo, R., Mitchell, G., Nguyen, V. Q., Zheng, W., Richards, A., Stevenson, E., Swaney, D. L., Krogan, N. J., Ernst, J. D., Cox, et al

  2025; 21 (10): e1012829

- **Tax1bp1 enhances bacterial virulence and promotes inflammatory responses during Mycobacterium tuberculosis infection of alveolar macrophages.** *bioRxiv : the preprint server for biology*

  Chin, J., Abeydeera, N., Repasy, T., Rivera-Lugo, R., Mitchell, G., Nguyen, V. Q., Zheng, W., Richards, A., Swaney, D. L., Krogan, N. J., Ernst, J. D., Cox, J. S., Budzik, et al

  2024

- **Autophagy restricts Mycobacterium tuberculosis during acute infection in mice (vol 8 , pg 819 , 2023)** *NATURE MICROBIOLOGY*

  Golovkine, G. R., Roberts, A. W., Morrison, H. M., Rivera-Lugo, R., McCall, R. M., Nilsson, H., Garelis, N. E., Repasy, T., Cronce, M., Budzik, J., Van Dis, E., Popov, L. M., Mitchell, et al

  2024; 9 (7): 1899

- **Deficiency in Galectin-3, -8, and -9 impairs immunity to chronic Mycobacterium tuberculosis infection but not acute infection with multiple intracellular pathogens.** *PLoS pathogens*
  Morrison, H. M., Craft, J., Rivera-Lugo, R., Johnson, J. R., Golovkine, G. R., Bell, S. L., Dodd, C. E., Van Dis, E., Beatty, W. L., Margolis, S. R., Repasy, T., Shaker, I., Lee, et al
  2023; 19 (6): e1011088

- **Autophagy restricts Mycobacterium tuberculosis during acute infection in mice.** *Nature microbiology*
  Golovkine, G. R., Roberts, A. W., Morrison, H. M., Rivera-Lugo, R., McCall, R. M., Nilsson, H., Garelis, N. E., Repasy, T., Cronce, M., Budzik, J., Van Dis, E., Popov, L. M., Mitchell, et al
  2023; 8 (5): 819-832

- **Distinct Energy-Coupling Factor Transporter Subunits Enable Flavin Acquisition and Extracytosolic Trafficking for Extracellular Electron Transfer in Listeria monocytogenes.** *mBio*
  Rivera-Lugo, R., Huang, S., Lee, F., Méheust, R., Iavarone, A. T., Sidebottom, A. M., Oldfield, E., Portnoy, D. A., Light, S. H.
  2023; 14 (1): e0308522

- **Listeria monocytogenes requires cellular respiration for NAD+ regeneration and pathogenesis.** *eLife*
  Rivera-Lugo, R., Deng, D., Anaya-Sanchez, A., Tejedor-Sanz, S., Tang, E., Reyes Ruiz, V. M., Smith, H. B., Titov, D. V., Sauer, J. D., Skaar, E. P., Ajo-Franklin, C. M., Portnoy, D. A., Light, et al
  2022; 11

- **RibU is an essential determinant of Listeria pathogenesis that mediates acquisition of FMN and FAD during intracellular growth.** *Proceedings of the National Academy of Sciences of the United States of America*
  Rivera-Lugo, R., Light, S. H., Garelis, N. E., Portnoy, D. A.
  2022; 119 (13): e2122173119

- **Post-translational flavinylation is associated with diverse extracytosolic redox functionalities throughout bacterial life.** *eLife*
  Méheust, R., Huang, S., Rivera-Lugo, R., Banfield, J. F., Light, S. H.
  2021; 10

- **A flavin-based extracellular electron transfer mechanism in diverse Gram-positive bacteria.** *Nature*
  Light, S. H., Su, L., Rivera-Lugo, R., Cornejo, J. A., Louie, A., Iavarone, A. T., Ajo-Franklin, C. M., Portnoy, D. A.
  2018; 562 (7725): 140-144