



Leah B. Bushin

Assistant Professor of Chemistry

Bio

BIO

Leah Bushin is a chemical biologist and natural products chemist working at the interface of primary and secondary metabolism and leverages these insights to discover and produce novel natural products.

The Bushin research group will investigate novel metabolic pathways, enzymes, and bioactive molecules across all kingdoms of life, intending to repurpose them to address challenges in human health and environmental sustainability. Current efforts will primarily center on developing strategies for the efficient microbial production of compounds and materials at scale, as well as high-throughput approaches for engineering enzymes to perform synthetic reactions. More broadly, as the group designs and refines bioproduction platforms, they hope to deepen their fundamental understanding of cellular metabolism. With genome sequencing revealing an immense reservoir of untapped biosynthetic potential, their work aims to uncover and harness nature's chemical diversity for drug discovery and synthetic derivatization.

ACADEMIC APPOINTMENTS

- Assistant Professor, Chemistry
- Faculty Fellow, Sarafan ChEM-H

HONORS AND AWARDS

- Postdoctoral Individual National Research Service Award (F32), National Institute of Health (2024)
- Graduate Research Fellowship, National Science Foundation (2017)

PROFESSIONAL EDUCATION

- A.B., Princeton University, Chemistry (2014)
- Ph.D., Princeton University, Chemistry (2021)
- Postdoc, Scripps Institution of Oceanography, UC San Diego

Teaching

COURSES

2025-26

- Biochemistry II: CHEM 183, CHEMENG 183, CHEMENG 283 (Win)
- Exploring Chemical Research at Stanford: CHEM 91 (Win)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

Ace Aguilar, Bailey Daymo, Kyla Hudson

Publications

PUBLICATIONS

- **Growth-coupled microbial biosynthesis of the animal pigment xanthommatin** *NATURE BIOTECHNOLOGY*
Bushin, L. B., Alter, T. B., Alvan-Vargas, M. V. G., Durr, L., Olson, E. C., Avila, M. J., Volke, D. C., Puiggene, O., Kim, T., Deravi, L. F., Feist, A. M., Nickel, P. I., Moore, et al
2025
- **Expanding the Landscape of Noncanonical Amino Acids in RiPP Biosynthesis** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Johnson, B. A., Clark, K. A., Bushin, L. B., Spolar, C. N., Seyedsayamdost, M. R.
2024; 146 (6): 3805-3815
- **Bicyclostreptins are radical SAM enzyme-modified peptides with unique cyclization motifs** *NATURE CHEMICAL BIOLOGY*
Bushin, L. B., Covington, B. C., Clark, K. A., Caruso, A., Seyedsayamdost, M. R.
2022; 18 (10): 1135-+
- **Discovery and Biosynthesis of Streptosactin, a Sactipeptide with an Alternative Topology Encoded by Commensal Bacteria in the Human Microbiome** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Bushin, L. B., Covington, B. C., Rued, B. E., Federle, M. J., Seyedsayamdost, M. R.
2020; 142 (38): 16265-16275
- **Total Synthesis and Stereochemical Assignment of Streptide** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Isley, N. A., Endo, Y., Wu, Z., Covington, B. C., Bushin, L. B., Seyedsayamdost, M. R., Boger, D. L.
2019; 141 (43): 17361-17369
- **Macrocyclization via an Arginine-Tyrosine Crosslink Broadens the Reaction Scope of Radical *S*-Adenosylmethionine Enzymes** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Caruso, A., Martinie, R. J., Bushin, L. B., Seyedsayamdost, M. R.
2019; 141 (42): 16610-16614
- **Aliphatic Ether Bond Formation Expands the Scope of Radical SAM Enzymes in Natural Product Biosynthesis** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Clark, K. A., Bushin, L. B., Seyedsayamdost, M. R.
2019; 141 (27): 10610-10615
- **A genetics-free method for high-throughput discovery of cryptic microbial metabolites** *NATURE CHEMICAL BIOLOGY*
Xu, F., Wu, Y., Zhang, C., Davis, K. M., Moon, K., Bushin, L. B., Seyedsayamdost, M. R.
2019; 15 (2): 161-+
- **Radical Approach to Enzymatic β -Thioether Bond Formation** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Caruso, A., Bushin, L. B., Clark, K. A., Martinie, R. J., Seyedsayamdost, M. R.
2019; 141 (2): 990-997
- **Charting an Unexplored Streptococcal Biosynthetic Landscape Reveals a Unique Peptide Cyclization Motif** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Bushin, L. B., Clark, K. A., Pelczer, I., Seyedsayamdost, M. R.
2018; 140 (50): 17674-17684
- **Guidelines for Determining the Structures of Radical SAM Enzyme-Catalyzed Modifications in the Biosynthesis of RiPP Natural Products** *RADICAL SAM ENZYMES*
Bushin, L. B., Seyedsayamdost, M. R.
edited by Bandarian
2018; 606: 439-460

- **Discovery of a Cryptic Antifungal Compound from *Streptomyces albus* J1074 Using High-Throughput Elicitor Screens** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Xu, F., Nazari, B., Moon, K., Bushin, L. B., Seyedsayamdost, M. R.
2017; 139 (27): 9203-9212
- **Discovery of *scmR* as a global regulator of secondary metabolism and virulence in *Burkholderia thailandensis*** **E264** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Mao, D., Bushin, L. B., Moon, K., Wu, Y., Seyedsayamdost, M. R.
2017; 114 (14): E2920-E2928
- **Acinetodin and Klebsidin, RNA Polymerase Targeting Lasso Peptides Produced by Human Isolates of *Acinetobacter gyllenbergii* and *Klebsiella pneumoniae*** *ACS CHEMICAL BIOLOGY*
Meteliev, M., Arseniev, A., Bushin, L. B., Kuznedelov, K., Artamonova, T. O., Kondratenko, R., Khodorkovskii, M., Seyedsayamdost, M. R., Severinov, K.
2017; 12 (3): 814-824
- **Structure and biosynthesis of a macrocyclic peptide containing an unprecedented lysine-to-tryptophan crosslink** *NATURE CHEMISTRY*
Schramma, K. R., Bushin, L. B., Seyedsayamdost, M. R.
2015; 7 (5): 431-437