

Serina L. Robinson

1. PERSONAL INFORMATION

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OrCID: [0000-0001-6947-7913](https://orcid.org/0000-0001-6947-7913); Google Scholar: [ObXdVF8AAAAAJ&hl](https://scholar.google.com/citations?user=ObXdVF8AAAAAJ&hl)

Languages: English: native, Norwegian: C1, German: B2

2. OVERVIEW

- Research areas: metagenome-guided discovery of microbial enzymes and pathways, pollutant biotransformations, biosynthesis, protein engineering, machine learning for enzyme specificity
- Proven ability as an educator, integrates research across disciplines including environmental biochemistry, microbiology and microbial ecology, computational biology and cheminformatics

3. PROFESSIONAL EXPERIENCE

- Sept 2021 – Present | **Group leader, tenure-track**
Department of Environmental Microbiology
Swiss Federal Institute of Aquatic Science and Technology (Eawag)
Dübendorf, Switzerland
- Aug 2020 – Aug 2021 | **ETH Postdoctoral research fellow**
Advisor: Prof. Dr. Jörn Piel, Institute of Microbiology
Eidgenössische Technische Hochschule (ETH) Zürich, Zürich, Switzerland
- Jun 2020 – Jul 2020 | **Postdoctoral researcher**, Advisor: Prof. Dr. Larry Wackett
University of Minnesota – Twin Cities, Minneapolis, MN, USA
- Jan 2019 – July 2019 | **National Science Foundation Ph.D. research fellow abroad (NSF GROW)**
Dept. of Bioinformatics, Advisor: Prof. Dr. Marnix Medema
Wageningen University & Research, Wageningen, the Netherlands
- Aug 2015 – Aug 2016 | **Fulbright research fellow**, Advisor: Prof. Dr. Mette M. Svenning
UiT: the Arctic University of Norway, Tromsø, Norway
- Aug 2013 – May 2015 | **EPA GRO research Fellow**, Advisors: Dr. Carlie A. Lalone, Dr. Tony Schroeder
U.S. Environ. Protection Agency Mid-continent Ecology Div., Duluth, MN, USA

4. EDUCATION

- Sept 2016 – May 2020 | **Ph.D., Microbiology**, defended May 27, 2020, Advisor: Prof. Dr. Larry Wackett
University of Minnesota – Twin Cities, Minneapolis, MN, USA
- Sept 2018 – April 2020 | **M.Sc., Bioinformatics and Computational Biology (dual degree with Ph.D.)**
University of Minnesota – Twin Cities, Minneapolis, MN, USA
- Sept 2011 – May 2015 | **B.A., Chemistry, B.A. Norwegian**, *summa cum laude*, (class rank 13/672)
Saint Olaf College, Northfield, MN, USA

5. TEACHING & EDUCATIONAL ACTIVITIES

- Yearly, fall semesters: 752-4001-00L *Microbiology*, ETHZ, core D-USYS/D-HEST course
- Yearly, spring semesters: 701-0220-00L *Practical Course in Microbiology*, ETHZ, core D-USYS
- June 2023: PEAK course lecturer, 'Transformationsprozesse von Spurenstoffen' (led in German)
- June 2023: 'Applied Meta'omics' metagenomics workshop leader and lecturer, ETHZ
- Oct 2021: Lorentz Center scientific workshop co-organizer and leader, Leiden, NL
- March 2021: P GL Bio I *Microbiology Practicum* (D-BIOL), lab group leader, ETHZ
- Sept 2017 – Dec 2018: MicB 3301 *Biology of Microorganisms*, lab instructor, Univ. of Minn., USA
- Jan 2014 – May 2015: CSCI 125 *Computer Science for Scientists*, co-lecturer, designed new curriculum and group projects, St. Olaf College, Northfield, MN, USA

6. SELECTED ORAL PRESENTATIONS

Robinson, S.L. (Invited talk, June 2024) Institute of Biology, University of Leiden, Leiden, NL.

Robinson, S.L. (Invited talk, June 2024) Microbial Secondary Metabolites in Microbiomes, Helsingør, DK.

Robinson, S.L. (Invited talk, May 2024) 4th Synthetic Biology of Natural Products Meeting, Yucatan, MX.

Robinson, S.L. (Invited talks, Feb/Apr 2024) D-USYS IBP seminar, ETH Zürich CH.

Robinson, S.L. (Invited talk, January 2024) Swiss Microbiomes Forum 2024, ETH Zürich, CH.

Robinson, S.L. (Invited online talk, January 2024) Oregon State University, Corvallis, OR, USA.

Robinson, S.L. (Invited talk, September 2023) Genetic Diversity Center Symposium, ETH Zürich, CH.

Robinson, S.L. (Invited talk, August 2023) Swiss-UK Synthetic Biology Symposium. UNIL, Lausanne, CH.

Robinson, S.L. (Invited talk, June 2023) Society for Industrial Microbiology and Biotechnology Annual Meeting (SIMB). Minneapolis, MN, USA.

Robinson, S.L. (Invited talk, March 2023) Department of Computational Biology, UNIL, Lausanne, CH.

Robinson, S.L. (Invited talk, Dec 2022) University of Applied Sciences FHNW, Muttentz, CH.

Robinson, S.L. (Selected talk, August 2022) International Society for Microbiology Ecology Conference (ISME18). Lausanne, CH.

Robinson, S.L., van der Hooft, J.J., Medema, M.H. (Invited talk, Sept 2021) Artificial Intelligence for Natural Product Drug Discovery Workshop. Lorentz Center, Leiden, NL.

Robinson, S.L. (Selected talk, February 2020). Gordon Research Seminar and Gordon Research Conference. Marine Natural Products, Ventura, CA, USA.

Robinson, S.L. (Selected talk, May 2019). Novo Nordisk Bioscience Conference. Natural Products - Discovery, Biosynthesis and Application. Hillerød, DK.

7. SELECTED AWARDS, GRANTS, FELLOWSHIPS, AND SCHOLARSHIPS

- 2023 Swiss National Science Foundation Ambizione Fellow (solo-PI)
- 2021 Joint Genome Institute Community Science Program (CSP) Functional Genomics award
- 2021 ETH Zürich Postdoctoral Fellowship Award (Advisor: Prof. Dr. Jörn Piel, ETH Zürich)
- 2020 Dr. Marvin and Hadassah Bacaner Award for outstanding PhD research
- 2020 Beatrice Z. Milne and Theodore Brandenburg Award for outstanding PhD thesis research
- 2016 U.S. Fulbright Fellowship
- 2016 National Science Foundation Graduate Research Fellowship (NSF GRFP)
- 2015 Arnold and Mabel Beckman Foundation Research scholarship
- 2014 Environmental Protection Agency Greater Research Opportunities Fellow (EPA GRO)

8. OUTREACH & PROFESSIONAL ACTIVITIES

- External PhD thesis examiner: DTU, DK (June 2024), Wageningen University, NL (May 2023)
- 2024: invited delegate, UK-Switzerland Synthetic Biology & Climate policy, Swiss Embassy, UK
- 2024 – Present: PI and member of the World Food System Center (WFSC), ETHZ
- 2023 – Present: PI and member, Microbiology and Immunology (MIM) Graduate Program, ETHZ
- 2022 – 2023 memberships: Society for Industrial Microbiology and Biotechnology (SIMB), Life Sciences Switzerland (LS²) member, International Society for Microbial Ecology (ISME)
- Seminar organization committee, Environmental Microbiology seminar series & Eawag seminars

9. SELECTED PUBLICATION AND PATENTS

Pre-prints and submitted manuscripts:

★denotes corresponding authorship

Probst, S.I., Felder, F., Poltorak, V., Mewalal, R., Blaby, I., ★**Robinson, S.L.** (2024). Enzymatic carbon-fluorine bond cleavage by human gut microbes. *bioRxiv*. doi: 10.1101/2024.07.15.601322.

Marti, T.M. Schweizer, D., Yu, Y., Schärer, M.R., Probst, S.I., ★**Robinson, S.L.** (2024). Machine learning reveals signatures of promiscuous microbial amidases for micropollutant biotransformations. *bioRxiv*. doi: 10.1101/2024.08.09.606993

Selected publications:

1. Attrah, M., Schärer, M., Esposito, M., Gionchetta, G., Bürgmann, H., Lens, P., Fenner, K.F., van de Vossenberg, J., ★**Robinson, S.L.** 2024. Disentangling abiotic and biotic effects of treated wastewater on stream biofilm resistomes enables discovery of a new planctomycete beta-lactamase. 12, 164. *Microbiome*. doi: 10.1186/s40168-024-01879-w.
2. Seller-Brison, C., Brison, A., Yu, Y., **Robinson, S.L.** and Fenner, K., 2024. Adaptation towards catabolic biodegradation of trace organic contaminants in activated sludge. *Water Research*, 122431. doi: 10.1016/j.watres.2024.122431
3. Feng, M., **Robinson, S.L.**, Qi, W., Edwards, A., Stierli, B., van der Heijden, M., Frey, B. and Varliero, G., 2024. Microbial genetic potential differs among cryospheric habitats of the Damma glacier. *Microbial Genomics*, 10(10), p.001301. doi: 10.1099/mgen.0.001301.
4. Bopp, C.E., Bernet, N.M., Meyer, F., Khan, R., **Robinson, S.L.**, Kohler, H.P.E., Buller, R. and Hofstetter, T., 2023. Elucidating the Role of O₂ Uncoupling for the Adaptation of Bacterial Biodegradation Reactions Catalyzed by Rieske Oxygenases. *ACS Environmental Au*. doi: 10.1021/acsenvironau.4c00016.
5. Yu, Y., Trottmann, N.F., Schaerer, M.R., Fenner, K., ★**Robinson, S.L.**, (2024) Substrate promiscuity of xenobiotic-transforming hydrolases from stream biofilms impacted by treated wastewater. *Water Research*. 256, 121593. doi: 10.1101/2023.09.27.559296.
6. ★**Robinson, S.L.** (2023) Structure-guided metagenome mining to tap microbial functional diversity. *Current Opinion in Microbiology*. doi: 10.1016/j.mib.2023.102382
7. Mullaney, M.W., Duncan, K.R., Elsayed, S.S., Garg, N., van der Hooft, J.J.,...van Westen, G.J.P., Hirsch, A.K., Linington, R.G., ★**Robinson, S.L.**, Medema, M.H. (2023) Artificial intelligence for natural product drug discovery. *Nature Reviews Drug Discovery*. doi: 10.1038/s41573-023-00774-7.
8. Feng, M., Varliero, G., Qi, W., Stierli, B., Edwards, A., **Robinson, S.L.**, van der Heijden, M., Frey, B. (2023) Microbial dynamics in soils of the Damma glacier forefield show succession in the microbial genetic potential. *Environmental Microbiology*. doi: 10.1111/1462-2920.16497
9. Marti, T.D., Schärer, M.R., ★**Robinson, S.L.** (2023) Microbial biocatalysis within us: the underexplored xenobiotic biotransformation potential of the urinary tract microbiota. *CHIMIA*, 77 (6), 424-431. doi: 10.2533/chimia.2023.424.
10. Fraley, A., **Robinson, S.L.**, and Piel, J., (2023) The versatile natural product enzymology of marine microbial communities. *Aldrichimica ACTA*. 55(3), 55-75.
11. Terlouw, B. R., Blin, K., Navarro-Muñoz, J. C., Avalon, N. E., Chevrette, M. G., ... **Robinson S.L.**, ...Weber, T., Medema, M. H. (2023). MIBiG 3.0: a community-driven effort to annotate experimentally validated biosynthetic gene clusters. *Nucleic Acids Research*, 51(D1), D603-D610. doi:10.1093/nar/gkac1049.
12. Paoli, L., Ruscheweyh, H.J., Forneris, C.C., Hubrich, F., Kautsar, S., Bhushan, A., Lotti, A., Claysen, Q., Salazar, G., Milanese, A., Carlström, C.I., Papadopoulou, C., Gehrig, D., ...Sullivan, M.B., Wincker, P., Zeller, G., ★**Robinson, S.L.**, ★Piel, J.P., ★Sunagawa, S. (2022) Biosynthetic potential of the global ocean microbiome. *Nature*, 1-8. doi: 10.1038/s41586-022-04862-3. ★co-corresponding.
13. Scott, T.A., Verest, M., Farnung, J., Forneris, C.C., **Robinson, S.L.**, Ji, X., Hubrich, F., Chepkirui, C., Richter, D.U., Huber, S., Rust, P., Streiff, A.B., Zhang, Q., Bode, J.W., Piel, J.P. (2022) Widespread microbial utilization of ribosomal β-amino acid-containing peptides and proteins. *Chem*, 8(10), 2659-2677. doi: 10.1016/j.chempr.2022.09.017.

14. Hubrich, F., Bösch, N.M., Chepkirui, C., Morinaka, B.I., Rust, M., Gugger, M., **Robinson, S.L.**, Vagstad, A.L., Piel, J. (2022) Ribosomally derived lipopeptides containing distinct fatty acyl moieties. *Proceedings of the National Academy of Sciences (PNAS)*, 119(3). doi:10.1073/pnas.2113120119
15. Paoli, L. & **Robinson, S.L.**, (2022) A wealth of new biosynthetic pathways from the global ocean microbiome. *Nature*, doi: 10.1038/d41586-022-01545-x.
16. Guo, F., McAuliffe, J.C., Bongiorno, C. Latone, J.A., Pepsin, M.J., Chow, M.S., Dhaliwal, R.S., Hoffmann, K.M., Brazil, B.T., Heng, M.H., **Robinson, S.L.**, Wackett, L.P., Whited, G.M. A procedure for removal of cyanuric acid in swimming pools using a cell-free thermostable cyanuric acid hydrolase. (2022) *Journal of Industrial Microbiology and Biotechnology*, 49(2), kuab084. doi: <https://doi.org/10.1093/jimb/kuab084>.
17. Mason-Jones, K.M., **Robinson, S.L.**, Veen, G.F., Manzoni, S.M., van der Putten, W.H. (2022) Microbial storage and its implications for soil ecology. 16, 617–629. *The ISME Journal*, doi: 10.1038/s41396-021-01110-w.
18. ★**Robinson, S.L.**, (2021) Artificial intelligence for microbial biotechnology: beyond the hype. *Microbial Biotechnology*, 15(1), 65-69. doi: 10.1111/1751-7915.13943.
19. ★**Robinson, S.L.**, Piel, J., Sunagawa, S. A. (2021) A roadmap for metagenomic enzyme discovery. *Natural Product Reports*, 38(11), 1994-2023. doi: 10.1039/D1NP00006C.
20. **Robinson, S.L.**, Biernath, T., Rosenthal, C., Young, D., Wackett, L.P., Martinez-Vaz, B.M. (2021) Development of the organonitrogen biodegradation database: teaching bioinformatics and collaborative skills to undergraduates. *Journal of Biology & Microbiology Education*, 22(1), ev22i1.2351. doi: 10.1128/jmbe.v22i1.2351.
21. Tracanna, V., Ossowicki, A., Petrus, M.L.C., Overduin, S., Terlouw, B.R., George Lund, G., **Robinson, S.L.**, Warris, S., Schijlen, E.G.W.M., van Wezel, G.P., Raaijmakers, J.M., Garbeva, P. Medema, M.H. (2021) Dissecting disease-suppressive rhizosphere microbiomes by functional amplicon sequencing and 10X metagenomics. *mSystems*, 6(3), e011116-20. doi: 10.1128/mSystems.011116-20.
22. ★**Robinson, S.L.**, Terlouw, B.R., Smith, M.D., Pidot, S.J., Stinear, T.P., Medema, M.H., Wackett, L.P. (2020) Global analysis of adenylate-forming enzymes reveals β -lactone biosynthesis pathway in pathogenic *Nocardia*. *Journal of Biological Chemistry*. 295(44), 14826-14839. doi: 10.1074/jbc.RA120.013528.
23. Wackett, L.P. & **Robinson, S.L.** (2020) The ever-expanding limits of enzyme catalysis and biodegradation: polyaromatic, polychlorinated, polyfluorinated, and polymeric compounds. *Biochemical Journal*, 477(15), 2875–2891. doi: 10.1042/BCJ20190720.
24. ★**Robinson, S.L.**, Smith, M.D., Richman, J.E., Aukema, K.G., Wackett, L.P. (2020) Machine learning-based prediction of activity and substrate scope for OleA enzymes in the thiolase superfamily. *Synthetic Biology*, 5(1), ysaa004. doi: 10.1093/synbio/ysaa004.
25. Smith M.D., **Robinson S.L.**, Molomjants M.M., Wackett L.P. (2020) *In vivo* assay reveals microbial OleA thiolases initiating hydrocarbon and β -lactone biosynthesis. *mBio*, 11(2), e00111-20. doi: 10.1128/mBio.00111-20.
26. Aukema, K.G., Tassoulas, L.J., **Robinson, S. L.**, Konopatski, J.F., Bygd, M.D., Wackett, L.P. (2020) Cyanuric acid biodegradation via biuret: physiology, taxonomy, and geospatial distribution. *Applied and Environmental Microbiology*, 86(2), e01964-19. doi: 10.1128/AEM.01964-19.
27. Kautsar, S.A., Blin, K., Shaw, S., Navarro-Muñoz, J.C., Terlouw, B.R., van der Hooff, J.J., van Santen, J., Tracanna, V., Suarez Duran, H.G., Andreu, V.P., Selem-Mojica, N., Alanjary, M., **Robinson, S.L.**, Lund, G., Epstein, S.C., Sisto, A.C., Charkoudian, L.K., Collemare, J., Linington, R., Weber, T., Medema, M.H. (2019) MIBiG 2.0: A repository for biosynthetic gene clusters of known function. *Nucleic Acids Research*, 48(D1), D454–D458. doi: 10.1093/nar/gkz882.
28. **Robinson, S.L.**, Christenson, J.K., Richman, J.E., Jenkins, D.J., Neres, J., Fonseca, D.R., Aldrich, C.C., Wackett, L.P. (2019) Mechanism of a standalone β -lactone synthetase: new continuous assay

for a widespread ANL superfamily enzyme. *ChemBioChem*, 20, 1701-1711. doi: 10.1002/cbic.201800821.

29. Tveit, A.T., Hestnes A.G., **Robinson, S.L.**, Schintlmeister, A., Dedysh, S., Jehmlich, N., von Bergen, M., Herbold, C., Wagner, M., Richter A., Svenning M.M. (2019) Widespread soil bacterium that oxidizes atmospheric methane. *Proceedings of the National Academy of Sciences*, 116(17), 8515-8524. doi: 10.1073/pnas.1817812116. *Winner of the 2019 Cozzarelli Prize in Biomedical Sciences
30. **Robinson, S.L.** & Wackett, L.P. Rings of power: enzymatic routes to β -lactones. (2019) In *Comprehensive Natural Products III: Chemistry and Biology, Enzymes and Enzyme Mechanisms*.
31. **Robinson, S.L.**, Christenson, J.K., Wackett, L.P. (2018) Biosynthesis and chemical diversity of β -lactone natural products. *Natural Product Reports* 36(3), 458-475. doi: 10.1039/C8NP00052B.
32. **Robinson, S. L.**, Badalamenti, J. P., Dodge, A.G., Tassoulas, L.J., Wackett, L.P. (2018) Microbial biodegradation of biuret: defining biuret hydrolases within the isochorismatase superfamily. *Environmental Microbiology* 20(6), 2099-2111. doi: 10.1111/1462-2920.14094.
33. **Robinson, S.L.** & Wackett, L.P. (2018) Diversity and taxonomy of aliphatic hydrocarbon producers. *Handbook of Hydrocarbon and Lipid Microbiology Series*, Springer-Nature, 1-20.
34. Wackett, L.P. & **Robinson, S.L.** (2018) The future of environmental microbiology. *Environmental Microbiology* 20(6), 1988–1990. doi: 10.1111/1462-2920.14256.
35. Vergauwen, L., Cavallin, J.E., Ankley, G.T., Bars, C., Gabriëls, I.J., Michiels, E.D.G., Fitzpatrick, K.R., Periz-Stanacev, J., Randolph, E.C., **Robinson, S.L.**, Saari, T.W., Schroeder, A.S., Stinckens, E., Swintek, J., Van Cruchten, S.J., Verbeuken E., Villeneuve, D.L., Knapen, D. (2018) Gene transcription ontogeny of hypothalamic-pituitary-thyroid axis development in early-life stage fathead minnow and zebrafish. *Gen. Comp. Endocrinology* 266, 87-100. doi: 10.1016/j.ygcen.2018.05.001
36. Christenson, J.K., **Robinson, S.L.**, Engel, T.A., Richman, J.E., Wackett, L.P. (2017) β -Lactone decarboxylase: function, mechanism, and linkage to class III haloalkane dehalogenases. *Biochemistry** 56(40), 5278–5287. doi: 10.1021/acs.biochem.7b00667. *Highlighted in *Science* as an Editor's Choice, 358(6367), 1144. doi: 10.1126/science.358.6367.1144.
37. Schulfer, A.F., Battaglia T., Alvarez, Y., Bijnens, L., Ruiz, V. E., Ho, M., **Robinson, S.L.**, Ward, T.W., Cox, L.M., Rogers, A.B., Knights, D., Blaser, M.J. (2017) Intergenerational transfer of antibiotic-perturbed microbiota enhances colitis in susceptible mice. *Nature Microbiology* 3(2), 234. doi: 10.1038/s41564-017-0075-5.
38. LaLone, C.A., Villeneuve, D.L., Lyons, D., Helgen, H.W., **Robinson, S.L.**, Swintek, J.A., Saari, T.W., Ankley, G.T. (2016) Sequence alignment to predict across species susceptibility (SeqAPASS): a web-based tool for addressing the challenges of cross-species extrapolation of chemical toxicity. *Toxicological Sciences* 153(2), 228-245. doi: 10.1093/toxsci/kfw119.

Patent applications filed:

Robinson, S.L., Christenson, J.K., Wackett, L.P. Biological production of β -lactones. U.S. Patent Application. 16/510,298, filed 13 February, 2020.