Leah Seebald, Ph.D.

Haverford College
370 Lancaster Ave, KINSC E214C
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Current position

Haverford College, Haverford, PA **7/2022 – Present**
Assistant Professor of Chemistry

Research aim: *Design and synthesize probes to study biological systems*
Project 1: Gram scale synthesis of rare bacterial sugars.
Project 2: Utilizing natural product 2*H*-azirine scaffolds as inspiration for covalent inhibitors.

Classes Taught at Haverford College:

- CHEM 225 Organic Reactions and Synthesis (2023, 2024)
- CHEM 222 Organic Biological Chemistry (2023)

Previous positions and education

Massachusetts Institute of Technology, Cambridge, MA **11/2017 – 5/2022**
Postdoctoral associate, laboratory of Barbara Imperiali, Ph.D.

Research aim: *Application of activity-based profiling probes for selective interrogation of bacterial phosphoglycosyl transferases*

- Synthesized probes for activity profiling a family of bacterial phosphoglycosyl transferases (PGTs), a potential drug target for mitigating bacterial virulence.
- Investigated nucleoside-diphospho-sugar substrate specificities of PGTs by assaying enzyme kinetics.
- Developed a uridine-based fluorescent assay to screen new inhibitors for *Clostridium difficile*, a Gram-positive bacterium that is a significant human pathogen.
- Facilitated a collaboration to develop uridine bisphosphonate sugars as PGT substrate mimics for inhibitor design.

Classes taught at MIT and relevant teaching experience:

- *Co-taught an advanced undergraduate course at MIT* **2/2021 – 5/2021**

Co-taught a class with my postdoctoral colleague, Dr. Christine Arbour. Working together, we collaboratively designed, developed and taught a class titled “Peptides and Nucleosides: Structures, Synthesis and Therapeutic Strategies.” This class covered the biology and chemistry of the essential building blocks of nature, peptides and nucleosides.

- *Kaufman Teaching Certificate Program at MIT* **5/2020 – 6/2020**

Intensive course organized at the Massachusetts Institute of Technology to understand the challenges associated with teaching and practice the most recent evidence-based learning strategies.

State University of New York at Albany (SUNY Albany), Albany, NY **8/2013 – 11/2017**
Ph.D. student, laboratory of Maksim Royzen, Ph.D.
Organic Chemistry, special focus on nucleotide chemistry
Dissertation title: *Development of Paramagnetic NMR Probes to Study RNA-Protein Interactions*

- Synthetic design and development of paramagnetic probes suitable for in-cell RNA-protein studies by nuclear magnetic resonance spectroscopy (by means of paramagnetic relaxation enhancement).
- Synthesized a heterobifunctional linker for direct conjugation of siRNA to iron oxide nanoparticles for in-cell delivery and temporal control of siRNA activation.
- Multidisciplinary research involving organic synthesis of modified nucleosides, synthesis and crystallographic characterization of transition metal complexes, extensive solid phase oligonucleotide synthesis, and characterization of RNA and RNA-protein complexes by mass spectrometry and 2D NMR.

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Interpace Diagnostics (RedPath Integrated Pathology), Pittsburgh, PA **6/2011 – 8/2013**
Molecular technologist, research advisor Sydney Finklestein, M.D.
Research focus: *Improve the accuracy of fluid chemistries on clinical pancreatic cyst samples*
Clinical supervisor: Mrs. Megan Blauvelt

- Performed laboratory tests on body fluid samples to determine malignancy of clinical cyst and tissue samples using techniques such as sequencing, PCR, capillary electrophoresis (CE).
- Head of laboratory quality control. This encompassed designing controls for experiments, writing and maintaining standard operational procedures (SOPs), and rigorous sample testing to ensure all reported data and tests met OSHA standards.

University of Pittsburgh, Pittsburgh, PA **2/2007 – 7/2011**
B.S. Research conducted in the laboratory of Geoffrey Hutchison, Ph.D.
Major: Chemistry
Research focus: *Rational design of single-molecule piezoelectric molecules*

Research articles

- Daly, C., **Seebald**, L., Wolk, E. Employing Metadynamics to Predict the Membrane Partitioning of Carboxy-2H-Azirine Natural Products. ChemRxiv. **2024**, doi:10.26434/chemrxiv-2024-m8v9m.
- (**Seebald**, L., Haratipour P.)*; Jacobs, M.; Bernstein, H.; Kashemirov, B.; McKenna, C.; Imperiali, B. Uridine Bisphosphonates Differentiate Phosphoglycosyl Transferase Superfamilies. *J. Am. Chem. Soc*. **2024**, 146, 3220-3229. *equal contributions
- (Anderson, A., **Seebald**, L.)*; Arbour, C.; Imperiali, B. Probing Monotopic Phosphoglycosyl transferases from Complex Cellular Milieu. *ACS Chem. Biol*. **2022**, 17, 11, 3191-3197. *equal contributions
- **Seebald**, L.; Madec, A.; Imperiali, B. Deploying Fluorescent Nucleoside Analogues for High Throughput Inhibitor Screening. *ChemBioChem.* **2019***,* 21, 108–112.
- Khan, I.; **Seebald**, L.; Yigit, M.; Royzen, M. Controlled In-Cell Activation of RNA Therapeutics Using Bond-Cleaving Bio-orthogonal Chemistry. *Chem. Sci.* **2017**, 8, 5705-5712.
- **Seebald**, L.; DeMott, C.; Ranganathan, S.; Asare-Okai, P. N.; Glazunova, A.; Chen, A.; Shekhtman, A.; Royzen, M. Cu(II)-Based Paramagnetic Probe to Study RNA-Protein Interactions by NMR. *J. Inorg. Chem.* **2017**, *56*, 3773–3780.
- **Seebald**, L.; DeMott, C.; Ranganathan, S.; Asare-Okai, P. N.; Glazunova, A.; Chen, A.; Shekhtman, A.; Royzen, M. Cobalt-Based Paramagnetic Probe to Study RNA-Protein Interactions by NMR. *J. Inorg. Biochem.* **2017**, 170, 202-208.
- Oneto, J. M.; Khan, I.; **Seebald**, L.; Royzen, M. In Vivo Bioorthogonal Chemistry Enables Local Hydrogel and systemic Pro-Drug to Treat Soft Tissue Sarcoma. *ACS Cent. Sci.* **2016**, 2, 476-482.
- Quan, X. F.; Marvin, C. W.; **Seebald**, L. M.; Hutchison, G.R. Single-Molecule Piezoelectric Deformation: Rational Design from First-Principles Calculations. *J. Phys. Chem.* **2013**, 117, 16783-16790.
- Khara, H.S.; Freed, L.; Jackson, S.A.; Ellsworth, E., Stearns, V.; Devlin, K.I., **Seebald**, L.; Patel, S.; Deftereos, G.; Silverman, J.F.; Finkelstein, S. D.; Gross, S.A. Evaluation of Mutational Load (ML) in Four Independent Datasets with Dysplastic and Non-Dysplastic Barrett's Esophagus. *Gastroenterology.* **2013**, 144, 685-686.

Invited Talks

- ACS, Division of Carbohydrate Chemistry and Chemical Glycobiology "Women in CARB" Talk titled "Probing phosphoglycosyl transferases with non-hydrolyzable substrate mimics." (3/19/2024)
- Saint Joseph's University. Talk titled "Inhibitor Development for Phosphoglycosyl transferases." (3/13/2024)

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Selected Presentations

- 2021 Building 68 virtual retreat, Cambridge, MA, United States. June 1, 2021. Oral Presentation, "Let's get active! Application of activity profiling probes for phosphoglycosyl transferases."
- 2019 Gordon Research Seminar, Nucleosides, Nucleotides, and Oligonucleotides June 21-22, 2019. Oral presentation titled, "Synthetic solvatochromic nucleosides as sensors for glycosyltransferases."
- 1st Annual Dana-Farber's Chemical Biology Symposium, Boston, MA, United States. September 14, 2018. Poster presentation, "Solvatochromic fluorophores for glycosyltransferase assays."
- 252nd ACS National Meeting and Exposition, Philadelphia, PA, United States, August 21-25, 2016. Poster presentation, "Site specific NMR probe to study *in vivo* RNA-protein binding."
- 250th ACS National Meeting and Exposition, Boston, MA, United States, August 16-20, 2015. Oral presentation titled, "Paramagnetic NMR probe to study RNA-protein binding."

Service

- External
  - NSF review panel 2024
- Internal (Haverford College)
  - Pre-Health committee (2023 – 2024)
  - KINSC Steering committee (2023 – 2024)

Awards and grants

- Distinguished Dissertation, State University of New York at Albany **5/2018**

Synergistic activities

- Mastery Charter School STEM Fair Judge **5/2024**
- 87th Annual Intercollegiate Students Chemists Convention (ISCC) Judge **4/2024**