

EDUCATION

2022	Doctor of Philosophy , Chemistry and Biochemistry Georgia Institute of Technology	Atlanta, GA
2012	Bachelor of Arts , Molecular Biology Pomona College	Claremont, CA

AWARDS, FELLOWSHIPS, AND HONORS

2021	Georgia Tech Astrobiology Fellowship Georgia Institute of Technology—College of Sciences Sutherland Dean's Chair	
2018	William Emerson Outstanding Second Year Seminar Award Georgia Institute of Technology—School of Chemistry & Biochemistry	
2017–2021	President's Fellowship Georgia Institute of Technology	
2012–2014	Provost's Ph.D. Fellowship University of Southern California	

RESEARCH EXPERIENCE

2017–2022	Graduate Research Assistant , Georgia Institute of Technology <i>Investigated the chemical origins of life, specifically the reaction of noncanonical nucleic acid bases with sugars to form proto-RNA molecules in early earth conditions, resulting in two publications and several conference presentations. Responsible for experimental design, execution, and analysis, report authorship, and collaboration management including among senior scientists & mentoring an undergraduate researcher.</i>	Atlanta, GA
2012–2014	Graduate Research Assistant , University of Southern California <i>Worked to cultivate archaeoglobus fulgidus in anaerobic systems, including use of an anaerobic glove box, oxygen-free media preparation, and microscopic analysis.</i>	Los Angeles, CA
2011–2012	Undergraduate Researcher , Pomona College <i>Investigated protein modification and its role in development in Drosophila melanogaster, specifically targeting an N-terminal modification to the cellular trafficking protein GDI. Utilized molecular cloning techniques to design primers for, clone, and express modified GDI followed by cellular localization studies.</i>	Claremont, CA
2010	Research Intern , Saban Research Institute <i>Investigated the effects of amniotic fluid stem cells on induced lung fibrosis in murine model organisms, including organ harvesting, sectioning, and microscopic analysis, and resulting in a publication.</i>	Los Angeles, CA

COMMUNICATION EXPERIENCE

2022–2023	Visiting Assistant Professor , Trinity University <i>Taught both lecture (Biochemistry I) and laboratory (Biochemistry Lab, Advanced Chemical Principles) courses in an undergraduate-focused liberal arts institution. Responsible for ongoing development of flipped-classroom methodology, updating assessments, and holding office hours for additional student learning.</i>	San Antonio, TX
2021–2022	Astrobiology Fellow , Georgia Institute of Technology <i>Developed and begin implementation of an undergraduate minor in Astrobiology modeled from the successful graduate certificate in astrobiology. Contributed to the hypothesis browser knowledge repository for astrobiology and origin-of-life science communication.</i>	Atlanta, GA
2021–2022	Biochemistry I Co-Teacher , Georgia Institute of Technology <i>Developed and delivered two lectures as part of Tech to Teaching Certificate Capstone, incorporating teaching strategies and lesson plan ideas developed throughout Tech to Teaching coursework.</i>	Atlanta, GA
2017–2018, 2021	Teaching Assistant , Georgia Institute of Technology <u>Biochemistry</u> : Facilitated a hybrid learning environment using both in-person and virtual communication. Responsible for assessment preparation and remote office hours, as well as two in-person lectures. <u>Quantitative Analysis</u> : Managed laboratory section of undergraduate chemistry students. Responsibilities included lesson prep, laboratory safety, time management, and procedural assistance.	Atlanta, GA

TECHNICAL EXPERIENCE

2015–2017	Technical Expert, Apple Store <i>Resolved both software and hardware issues on mobile devices, including physical repair and software troubleshooting. Responsible for managing customer expectations and setting and holding one-on-one appointments with customers in a fast-paced environment.</i>	San Diego, CA
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LEADERSHIP EXPERIENCE

2021–2022	Secretary, ExplOrigins Executive Board , Georgia Institute of Technology <i>Maintained Georgia Tech Astrobiology website, active organization roster, and meeting minutes. Coordinated multiple events including socials, public talks, and the annual ExplOrigins Colloquium.</i>	Atlanta, GA
2020–2022	Chair, Gordon Research Seminar (GRS): Origins of Life <i>Responsible for planning a significant conference in the field, including obtaining funding; setting the conference details, and maintaining conference plan information for future implementation despite late-term cancellation due to COVID-19 pandemic.</i>	
2019	External Organizer, Astrobiology Graduate Conference <i>Organized and managed the Proposal Writing Retreat, overseeing the schedule and hosting 25+ students. Responsibilities included logistics of food, lodging, and retreat scheduling, and applicant team assignments.</i>	Salt Lake City, UT

OUTREACH EXPERIENCE

2017–2020	Member, Center for Chemical Evolution , Georgia Institute of Technology <i>Aided in the creation and implementation of both science demonstrations and media activities aimed at engaging students of various ages in the fields of astrobiology and STEAM, including events at local elementary schools, science festivals, and outreach events.</i>	Atlanta, GA
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SCIENTIFIC POSTERS AND PRESENTATIONS

1.	T. P. Roche , P. J. Nedumpurath, D. M. Fialho, G. B. Schuster, N. V. Hud. Prebiotic Reactivity of Noncanonical Nucleobases. ExplOrigins Colloquium (2022), Georgia Tech, Atlanta, GA (Poster)
2.	T. P. Roche , D. M. Fialho, C. Menor Salván, R. Krishnamurthy, G. B. Schuster, N. V. Hud. Robust Ribonucleosides: A Pathway to Ribose from Simple Sugars via Ketose Intermediates. AbGradCon (2021) Virtual, (https://www.youtube.com/watch?v=fVZaOfYDK7Q)
3.	T. P. Roche , D. M. Fialho, C. Menor Salván, R. Krishnamurthy, G. B. Schuster, N. V. Hud. Ketoses: The Key to Prebiotic Nucleoside Formation? Prebiotic Chemistry and Early Earth Environments Seminar Series (2021), Virtual (https://www.youtube.com/watch?v=xwOHUG1WSDc)
4.	T. P. Roche , D. M. Fialho, C. Menor-Salván, R. Krishnamurthy, G. B. Schuster, N. V. Hud. Origins of Life: What Role did Sugars Play? ExplOrigins Colloquium (2021), Georgia Tech, Atlanta, GA (Poster)
5.	T. P. Roche , D. M. Fialho, G. B. Schuster, N. V. Hud. Prebiotic Relevance of Ketose Sugars to the Origin of Aldose Nucleosides. American Chemical Society Spring Meeting (2020), Virtual (Digital Slide Presentation)
6.	T. P. Roche , D. M. Fialho, G. B. Schuster, R. Krishnamurthy, N. V. Hud. Robust Ribonucleosides: A Pathway to Ribose from Simple Sugars via Ketose Intermediates. Gordon Research Conference: Origins of Life (2020), Galveston, TX (Poster, also presented at ExplOrigins Colloquium 2020)
7.	T. P. Roche , D. M. Fialho, G. B. Schuster, R. Krishnamurthy, N. V. Hud. Prebiotic Relevance of Ketose Sugars to the Origin of Aldose Nucleosides. Astrobiology Science Conference (2019), Bellevue, WA (Oral Presentation)
8.	T. P. Roche , D. M. Fialho, G. B. Schuster, R. Krishnamurthy, N. V. Hud. Sugars and the Origin of Life: Unlocking Ribose with Ketose Sugars. ExplOrigins Colloquium (2019), Georgia Tech, Atlanta, GA (Poster)
9.	T. P. Roche , D. M. Fialho, R. Krishnamurthy, N. V. Hud. The Condensation of a Model Proto-RNA Nucleobase with Ribulose: A Prebiotic Pathway to RNA. Astrobiology Graduate Conference (2018), Georgia Tech, Atlanta, GA (Poster, updated from below)
10.	T. P. Roche , D. M. Fialho, R. Krishnamurthy, N. V. Hud. The Condensation of a Model Proto-RNA Nucleobase with Ribulose: A Prebiotic Pathway to RNA. Georgia Tech Astrobiology Colloquium (2018), Atlanta, GA (Poster)

PUBLICATIONS

1. **T. P. Roche**, D. M. Fialho, P. J. Nedumpurath, B. N. Lindgren, S. Mangalath, G. B. Schuster, N. V. Hud. Prebiotic Reactivity of Noncanonical Nucleosides. In prep.
2. **T. P. Roche**, D. M. Fialho, C. Menor-Salván, R. Krishnamurthy, G. B. Schuster, N. V. Hud. A Plausible Path to Nucleosides: Ribosides and Related Aldosides are Generated from Ribulose, Fructose, and Similar Abiotic Precursors. *Chem. Eur. J.*, Accepted Author Manuscript.
3. L. E. Rodriguez, T. Altair, N. Y. Hermis, T. Z. Jia, **T. P. Roche**, L. H. Steller, J. M. Weber. Chapter 4: A Geological and Chemical Context for the Origins of Life on Early Earth, in *Astrobiology Primer 3.0* special issue, edited by M. Schaible, N. Szeinbaum, and G. Tan. *Astrobiology*, in revision.
4. D. M. Fialho, **T. P. Roche**, N. V. Hud. Prebiotic Syntheses of Noncanonical Nucleosides and Nucleotides. *Chem. Rev.* **120**, 4806–4830 (2020).
5. O. Garcia, G. Carraro, G. Turcatel, M. Hall, S. Sedrakyan, **T. Roche**, S. Buckley, B. Driscoll, L. Perin, D. Warburton. Amniotic fluid stem cells inhibit the progression of bleomycin-induced pulmonary fibrosis via CCL2 modulation in bronchoalveolar lavage. *PLOS ONE* **8**(8): e71679 (2013).

PROFESSIONAL MEMBERSHIPS

2021–Present Origin of Life Early Career Network—<https://oolen.org/>