

Gregory P. Fournier

Associate Professor of Geobiology
Department of Earth, Atmospheric, and Planetary Sciences
Massachusetts Institute of Technology
Cambridge, MA 02139
g4nier@mit.edu; (617) 324-6164

Education

- 2004-2009 **University of Connecticut**, Storrs, CT
Ph.D. in Genetics and Genomics, May 2009
Thesis advisor: J. Peter Gogarten
Thesis: Genetic Code Evolution and Amino Acid Composition Analysis
- 1997-2001 **Dartmouth College**, Hanover, NH
A.B. in Genetics, Cell and Developmental Biology, June 2001.

Positions Held

- 2019-present Associate Professor of Geobiology, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA
- 2014-2019 Assistant Professor of Geobiology, Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA
- 2013-2014 Postdoctoral Associate, Department of Biological Engineering, Massachusetts Institute of Technology, Cambridge, MA
- 2010-2012 NASA Astrobiology Institute Postdoctoral Fellow, Massachusetts Institute of Technology, Cambridge, MA
- 2009-2010 Postdoctoral Associate, Department of Molecular and Cell Biology, University of Connecticut, Storrs, CT
- 2004-2009 Graduate research and teaching assistant, Department of Molecular and Cell Biology, University of Connecticut, Storrs, CT
- 2002-2004 Research Technician, Synthetic Biology Research Group, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA
- 2002 Research Technician, Harvard Medical School/Mass General Hospital, Division of Infectious Diseases, Cambridge, MA
- 2000 Research Technician, Dartmouth Hitchcock Medical Center/Thayer School of Engineering, Biomedical Laser Application Research Laboratory, Hanover, NH

Awards and Fellowships

- 2022 Recipient of MIT John W. Jarve Seed Fund Award for Science Innovation
- 2021, 2023 Fellow, Signatures of Life in the Universe Initiative, RSCA/Heising-Simons Foundation
- 2016 Cecil and Ida Green Career Development Assistant Professorship
- 2012 Young Investigator Selected Talk: American Society of Microbiology 112th General Meeting, San Francisco CA
- 2012 Best Seminar Talk, Gordon Research Conference on Origin of Life, Galveston TX
- 2010-2012 NASA Astrobiology Postdoctoral Fellowship
- 2008 Phi Kappa Phi, University of Connecticut Chapter

2008	Sherwood Chang Award for Student Excellence in the Origin of Life: Gordon Research Conference on Origin of Life, Ventura CA
2007	Program for Excellence in Science Sponsored Membership Award, American Association for the Advancement of Science
2005	Poster Award, NASA 2005 Exobiology Principal Investigator Symposium, NASA Ames Research Center, Mountain View CA
2004-2006	Outstanding Scholars Program Fellowship Award: University of Connecticut, Storrs CT
2003	Poster Award, Computational and Systems Biology Initiative Symposium, Massachusetts Institute of Technology, Cambridge MA
2001	Citation, Outstanding performance in Bioinformatics, Dartmouth College, Hanover NH
2000	Citation: Outstanding performance in Developmental Biology, Dartmouth College, Hanover NH

Additional Faculty Roles

Faculty, EAPS/Woods Hole Oceanographic Institute Joint Program, Biological Oceanography
 Faculty, MIT Microbiology Graduate Program

Invited Talks and Seminars

Oct 2023	Pennsylvania State University, Penn State Astrobiology Seminar Series State College, PA <i>"Integrating the genomic and geochemical records of Earth's oxygen history"</i>
Mar 2023	Stony Brook University Department of Geosciences Colloquium Series Stony Brook, NY <i>"How old are Bacteria? New Estimates for the Age of the Biosphere"</i>
Jan 2023	American Society of Naturalists Annual Meeting Pacific Grove, CA <i>"Photosynthesis and the Archean Oxygen Cycle"</i>
June 2022	Cooperative Institute for Dynamic Earth Research (CIDER) workshop University of California, Berkeley, CA <i>"How old are Cyanobacteria? Phylogenies and Controversies"</i>
May 2022	Astrobiology Science Conference (ABSciCon) Atlanta, GA <i>"Molecular Clock Dates for Bacterial Origins support Eoarchaeon Impact Bottleneck Habitability Scenarios"</i>
May 2022	European Geosciences Union (EGU) General Assembly Vienna, Austria <i>"Molecular Clock Dates for Bacterial Origins are consistent with Impact Bottleneck Scenarios"</i>
April 2022	Harvard Origins Initiative Seminar Harvard University, Cambridge, MA <i>"How old are Bacteria? Integrating molecular, paleontological, and planetary records"</i>

March 2022 ProSyn Fest
Cordoba, Spain
"Novel Constraints Improve Divergence Time Estimates for Picocyanobacteria, Suggesting a History Marked by Mass Extinctions and Recoveries"

January 2022 Institute of Ecology & Evolution
University of Oregon, Eugene, OR
"How old are Bacteria?"

November 2020 Prebiotic Chemistry and Early Earth Environments (PCE3) Workshop
NASA Astrobiology Program Research Coordination Network
"Rewinding Life's Clock"

December 2019 Astrobiology Lecture Series: Planets, Life and the Universe
Space Telescope Science Institute, Johns Hopkins University, Baltimore MD
"Reconstructing Life History before LUCA"

October 2019 The Geological Society of America 131st Annual Meeting, Phoenix, AZ
"Phylogenetic Evidence For Mass Extinctions of Microbial Anoxygenic Phototrophs in Earth History"

March 2019 International Conference "Life3E 2019: Search for Life – from Early Earth to Exoplanets"
International Center for Interdisciplinary Science Education, Quy Nhon, Vietnam
Keynote talk: *"LUCA: A complex end, and an ordinary beginning"*

December 2018 School of Earth and Atmospheric Sciences & Biological Sciences
Georgia Institute of Technology, GA
"A well-resolved pre-LUCA history of Class I aminoacyl-tRNA synthetase proteins reveals a critical link to the RNA world"

September 2018 Department of Earth, Environmental and Planetary Sciences
Brown University, Providence, RI
"Testing Biogeochemical Hypotheses of Microbial Evolution using Time-Calibrated Phylogenetic Trees"

August 2018 Goldschmidt 2018 Conference
Boston, MA
"Testing Biogeochemical Hypotheses of Microbial Evolution using Time-Calibrated Gene Transfer Phylogenies"

March 2018 Department of Earth Sciences Seminar
University of Southern California, Los Angeles, CA
"Evaluating the Planetary Record of Microbial Systems using Genomic Evidence"

October 2017 The Geological Society of America 129th Annual Meeting
Seattle, WA
"Establishing Stratigraphic Principles of Microbial Genome Evolution"

October 2017 52nd Annual American Society of Microbiology Region 1 Meeting "The Challenging Microbial Landscape"
University of Connecticut, Storrs, CT

"The Genome Stratigraphic Record: Establishing a robust criteria for using time-calibrating gene transfer events"

- June 2017 Geobiology Society Conference
Banff, Alberta Canada
"Dating the Origin and Diversification of Cyanobacteria"
- May 2017 Harvard Origins of Life Initiative Forum
Harvard University, Cambridge, MA
"Between RNA World and LUCA: Physiological, Ecological, and Phylogenetic Inference"
- May 2017 Simons Foundation Collaboration on the Origin of Life Annual Meeting
New York, NY
"Between RNA World and LUCA: Physiological, Ecological, and Phylogenetic Inference"
- April 2017 Astrobiology Science Conference (ABSciCon)
Mesa, AZ
"Between RNA World and LUCA: Physiological, Ecological, and Phylogenetic Inference"
- March 2017 Northeastern Geobiology Symposium
University of Connecticut, Storrs, CT
"A Phylogenetic Signal for Paleoproterozoic Reorganization of the Global Sulfur Cycle"
- September 2016 Department of Geology & Geophysics Seminar
Yale University, New Haven, CT
"Dating the Origins of Cyanobacteria: Solving Stem Lineage Problems using Reticulate Evolution"
- July 2016 School of Biological Sciences Seminar
Canterbury University, Christchurch, Canterbury NZ
"An Elusive Planetary Puzzle: Mapping the Origins of Phototrophic Microbial Lineages using Reticulate Evolution"
- July 2016 Society for Molecular Biology and Evolution Annual Meeting,
Gold Coast, Queensland, AUS.
"Mapping the Physiological and Metabolic Adaptations to Oxygen across the Archaea"
- January 2016 Gordon Research Conference: Geobiology, Galveston TX
"Estimated Divergence Times of Purple and Green Sulfur Bacteria Independently Support a Paleoproterozoic Onset of Marine Euxinia"
- January 2016 Gordon Research Conference: Origin of Life, Galveston TX
"What Genetic Characteristics Precede LUCA?"
- October 2015 Harvard University Paleobiology Seminar Series
Cambridge, MA
"Dating Microbial Phylogeny Using Horizontal Gene Transfer and Meta-Alignments"

May 2015 Eisenstein Symposium on Computational Perspectives on Origins
Oberlin College, Oberlin, OH
"New calibrations for dating the origin and evolution of the Archaea"

April 2015 Department of Geosciences Seminar
Princeton University, Princeton, NJ
"A Time-Calibrated Tree of Archaea Constrains Planetary Biogeochemical History"

March 2015 Institute for Genomic Biology Seminar
University of Illinois at Urbana-Champaign
"Partial Horizontal Gene Transfer and the Tree of Life"

March 2015 Company of Biologists Workshop: Eukaryo-/Archaeogenesis; Where Do We Stand?
Steyning, West Sussex, U.K.
"Horizontal Gene Transfer with Partial Orthologous Displacement in Conserved Gene Datasets Impacts Phylogenetic Investigations of Eukaryogenesis"

March 2015 Simons Foundation Collaboration on the Origin of Life Annual Meeting
New York, NY
"Genome Stratigraphy: Physiological and Temporal Reconstruction of Early Life"

June 2014 Society for Molecular Biology and Evolution Annual Meeting,
San Juan, Puerto Rico
"Partial Horizontal Gene Transfer and Reconstructing the Tree of Life"

January 2014 Round Table Workshop on the Origins of Life, ELSI Earth-Life Science Institute,
Tokyo, Japan
"The Meaning of Meaning: Information and Semiosis in Biology"

November 2013 Special Seminar, Department of Earth, Atmospheric, and Planetary Science,
Massachusetts Institute of Technology, Cambridge MA
"Paleogenomics 2.0: A Planetary Perspective"

October 2013 Microbial Systems Seminar, Department of Civil and Environmental Engineering,
Massachusetts Institute of Technology, Cambridge, MA
"A Molecular Rosetta Stone: Cyanobacterial Gene Transfers Time-Calibrate the History of Life"

May 2013 NASA Astrobiology Institute Executive Council Meeting, Cambridge, MA
"Ancestral Reconstruction of pre-LUCA Protein Family Ancestors"

March 2013 ELSI Earth-Life Science Institute International Symposium, Tokyo, Japan
"Evolutionary Genomics and the Origin of Life: Insights and Constraints"

February 2013 NASA Human Research Program Investigators' Workshop, Galveston, TX
Plenary Speaker: *"Applied Astrobiology: from Early Life Evolution to Medical Genomics and Drug Discovery"*

January 2013 SMBE Satellite Workshop on the Origin Of Life, Princeton University, Princeton, NJ
"Recombining Horizontal Gene Transfers Resolve Conflicting Narratives for the Origin of Eukaryotes"

October 2012 NASA Astrobiology Institute Origin of Life Focus Group Seminar Series, web seminar

“Pre-LUCA Ancestral Reconstruction of Synthetase Proteins Supports a Late Addition of Trp to the Genetic Code”

- October 2012 Department of Biology Seminar, Johns Hopkins University, Baltimore, MD
“Horizontal Gene Transfer: An Unexpected Ally in Medical Genomics”
- August 2012 JHMI Space Life Sciences Conference, Johns Hopkins University School of Medicine, Baltimore MD
“Medical Paleogenomics: Uniting Astrobiology, Evolution, and Medicine”
- June 2012 American Society of Microbiology 112th General Meeting, San Francisco CA
“The Permian-Triassic Extinction Event is Associated with the Evolution of Acetoclastic Methanogenesis via Horizontal Gene Transfer”
- May 2012 Space Telescope Science Institute, Planets, Life and the Universe Lecture Series, Johns Hopkins University, Baltimore MD
“The Phylogenomic Record: Reconstructing the Timing and Mechanisms of Early Life Evolution”
- April 2012 Astrobiology Science Conference, Georgia Institute of Technology, Atlanta GA
“Origin and Expansion of the Genetic Code: Transcending the RNA World”
“Ancient Horizontal Gene Transfer and Recombination: Complex Histories Reveal Mechanisms of Selection”
- March 2012 Center for Computational & Integrative Biology, Harvard Medical School, Szostak Lab, Boston MA
“The Decline and Fall of the RNA world”
- January 2012 Gordon Research Conference on the Origin of Life Galveston TX
“The Decline and Fall of the RNA world”
- June 2011 Astrobiology Graduate Conference, Montana State University, Bozeman MT
“Ancestral Reconstruction of Synthetase Paralogs: Inferring Ancient Events in Genetic Code Evolution”
- June 2011 Boston Bacterial Meeting, Harvard University, Cambridge MA
“Evolution of a Novel Methanogenic Pathway Contemporaneous with the Permian-Triassic Extinction”
- April 2011 Biology Departmental Seminar, Dartmouth College, Hanover NH
“Life before LUCA: Inferring evolutionary events from deep ancestral sequence reconstructions”
- October 2010 NASA Astrobiology Institute Advent of Complex Life Team Meeting, Harvard University, Cambridge MA
“Reconstruction of Deep Ancestral Sequences: Composition, Transfer and Recombination”
- April 2010 Astrobiology Science Conference, League City TX
“Inferring the Early Evolution of Translation: Ancestral Reconstruction, Compositional Analysis, and Functional Specificity”
- January 2010 Gordon Research Conference: Origin of Life, Galveston TX

“Protein evolution before the MRCA: Ancestral Reconstruction, Compositional Analysis, and Functional Specificity”

- May 2009 American Society for Microbiology 109th General Meeting, Philadelphia PA
“Horizontal Gene Transfer and the Evolution of Methanogenesis”
- December 2008 Computer Science and Artificial Intelligence Departmental Seminar, Massachusetts Institute of Technology, Cambridge MA
“The Secret Life of the Genetic Code: Past and Present”
- November 2006 New England Molecular Evolutionary Biologists Meeting, University of Massachusetts, Amherst MA
“Evolution of Acetoclastic Methanogenesis in Methanosarcinales via Horizontal Gene Transfer from Clostridia”
- July 2006 Gordon Research Conference and Graduate Research Seminar: Origin of Life, Bates College, Lewiston ME
“Methanogenesis: an ancient transfer event?”

Publications (In Revision)

Lyons TW, Tino CJ, **Fournier GP**, Anderson RE, Leavitt, WD, Konhauser KO, Stüeken EE. (2024) *Co-evolution of early Earth environments and microbial life*. In revision at: Nature Microbiology

Publications (Accepted)

Magnabosco C, Husain F, Paoletti M, Parsons C, Payette J, Tamre E, **Fournier GP**. (2024) *Towards a Natural History of Microbial Life*. Accepted at: Annual Review of Earth and Planetary Sciences.

Barge L, **Fournier GP**. (2024) *Considerations for Detecting Organic Indicators of Metabolism on Enceladus*. Accepted at: Astrobiology.

Publications

Skoog EJ, **Fournier GP**, Bosak T. (2023) *Assessing the Influence of HGT on the Evolution of Stress Responses in Microbial Communities from Shark Bay, Western Australia*. *Genes (Basel)*. 14(12):2168. doi:10.3390/genes14122168.

Gulay A, **Fournier G**, Smets BF, Girguis PR. (2023) *Proterozoic Acquisition of Archaeal Genes for Extracellular Electron Transfer: A Metabolic Adaptation of Aerobic Ammonia-Oxidizing Bacteria to Oxygen Limitation*. *Molecular Biology and Evolution* 40(8):msad161. doi:10.1093/molbev/msad161.

Rangel LT, **Fournier GP**. (2023) *Fast-Evolving Alignment Sites Are Highly Informative for Reconstructions of Deep Tree of Life Phylogenies*. *Microorganisms* 11, 2499. doi: 10.3390/microorganisms11102499.

Paoletti MM, **Fournier GP**, Dolan EL, Saito MA. (2023) *Metaproteogenomic Profile of a Mesopelagic Adenylylsulfate Reductase: Course-Based Discovery Using the Ocean protein Portal*. *Journal of Proteome Research*. 22(9):2871-2879. doi: 10.1012/acs.jproteome.3c00152.

- Zhang X, Paoletti MM, Izo G, **Fournier GP**, Summons RE. (2023) *Late acquisition of the rTCA carbon fixation pathway by Chlorobi*. *Nature Ecology & Evolution*. 7(9):1398-1407. doi: 10.1038/s41559-023-02147-0.
- Capovilla G, Braakman R, **Fournier GP**, Hackl T, Schwartzman J, Lu X, Yelton A, Longnecker K, Soule MK, Thomas E, Swarr G, Mongera A, Payette J, Waldbauer J, Kujawinski EB, Cordero OX, Chisolm SW. (2023) *Chitin utilization by marine picocyanobacterial and the evolution of a planktonic lifestyle*. *Proceedings of the National Academy of Sciences USA*. 120(20):e2213271120. doi:10/1073/pnas.2213271120.
- Schwartz SS, Rangel LT, Payette J, **Fournier GP**. *A Proterozoic microbial origin of extant cyanide-hydrolyzing enzyme diversity*. (2023) *Frontiers in Microbiology: Evolutionary and Genomic Microbiology*. 14:1130310. doi: 10.3389/fmicb.2023.1130310.
- Mondal A, Rangel LT, Payette J, **Fournier GP**, Bansal MS. *DaTeR: Error-Correcting Phylogenetic Chronograms Using Relative Time Constraints*. (2023) *Bioinformatics*. 39(2):btad084. doi: 10.1093/bioinformatics/btad084.
- Paoletti M, **Fournier GP**. (2022) Chimeric inheritance and crown-group acquisitions of carbon fixation genes within Chlorobiales: Origins of autotrophy in Chlorobiales and implication for geological biomarkers. *PLOS ONE* 17(10):e0275539. doi: 10.1371/journal.pone.0275539.
- Schwartz SS, Garcia AK, Kaçar B, **Fournier GP**. (2022) *Early nitrogenase ancestors encompassed novel active site diversity*. *Molecular Biology and Evolution*. 39(11): doi: 10.1093/molbev/msac226.
- Fournier GP**, Parsons CW, Cutts EM, Tamre E. (2022) *Standard Candles for Dating Microbial Lineages*. In Luo H ed; *Environmental Microbial Evolution: Methods and Protocols*. Humana Press. P 41-74.
- Tamre E, **Fournier GP**. (2022) *Inferred ancestry of scytonemin biosynthesis proteins in cyanobacteria indicates a response to Paleoproterozoic oxygenation*. *Geobiology*. 20:764-775. doi: 10.1111/gbi.12514.
- Shang H, Rothman D, **Fournier GP**. (2022) *Oxidative metabolisms catalyzed Earth's oxygenation*. *Nature Communications*. 13:1328. doi:10.1038/s41467-022-28996-0.
- Schwartz SL, Momper LM, Rangel LT, Magnabosco C, Murali R, Amend JP, **Fournier GP**. (2022) *Novel nitrite reductase domain structure suggests a chimeric denitrification repertoire in Phylum Chloroflexi*. *Microbiology open*. 11:e1258. doi:10.1002/mbo3.1258.
- Fournier GP**, Moore KR, Bosak T, Payette J, Rangel LT. (2021) *The Archean origin of oxygenic photosynthesis and extant cyanobacterial lineages*. *Proc Biol Sci*. 288: 20210675. doi: 10.1098/rspb.2021.0675.
- Rangel LT, Soucy SM, Setubal JC, Gogarten JP, **Fournier GP**. (2021) *An efficient, non-phylogenetic method for detecting genes sharing evolutionary signals in phylogenomic datasets*. *Genome Biol Evol*. 13:evab187. doi:10.1093/gbe/evab187.
- Wade T, Rangel LT, Kunda S, **Fournier GP**, Bansal MS. 2020. Assessing the accuracy of phylogenetic rooting methods on prokaryotic gene families. *PLoS One*. 15(5):e0232950.
- Stuekeen E, **Fournier GP**, Eyster A. 2020. Life as a Planetary Process. In Meadows V et al. eds; *Planetary Astrobiology*. Tuscon, AZ: The University of Arizona Press. P 93-120.

- Taverne YJ, Caron A, Diamond C, **Fournier G**, Lyons TW. (2019) *Oxidative stress and the early coevolution of life and biospheric oxygen*. pg. 67-85. In *Oxidative Stress: Eustress and Distress*. Ed. Helmut Sies.
- Moore KR, Magnabosco C, Momper L, Gold D, Bosak T, **Fournier GP**. (2019) *An Expanded Ribosomal Phylogeny of Cyanobacteria Supports a Deep Placement of Plastids*. *Front Microbiol.* 10:1612. Doi:10.3389/fmicb.2019.01612.
- Daye M, Klepac-Ceraj V, Pajusalu M, Rowland S, Farrell-Sherman A, Beukes N, Tamura N, **Fournier G**, Bosak T. (2019) Light-driven anaerobic microbial oxidation of manganese. *Nature.* 576(7786):311-314.
- Gruen D, Wolfe JM, **Fournier GP**. (2019) Paleozoic diversification of terrestrial chitin-degrading bacterial lineages. *BMC Evolutionary Biology.* 19:34:doi:10.1186/s12862-019-1357-8.
- Fournier GP**, Poole AM. (2018) *A Briefly Argued Case That Asgard Archaea Are Part of the Eukaryote Tree*. *Front Microbiol.* 9:1896:doi:10.3389/fmicb.2018.01896.
- Wolfe JM, **Fournier GP**. (2018) Reply to 'Molecular clocks provide little information to date methanogenic Archaea'. *Nat Ecol Evol.* 2(11):1678.
- Wolfe JM, **Fournier GP**. (2018) *Horizontal gene transfer constrains the timing of methanogen evolution*. *Nature Ecology & Evolution* 2(5):897-903.
- Magnabosco C, Moore KR, Wolfe JM, **Fournier GP**. (2018) *Dating phototrophic microbial lineages with reticulate gene histories*. *Geobiology.* 16(2):179-189.
- Cantine M, **Fournier G**. (2017) *Environmental Adaptation From the Origin of Life to the Last Universal Common Ancestor*. *Origins of Life and Evolution of Biospheres.* doi:10.1007/s11084-017-9542-5.
- Gold D, Caron A, **Fournier G**, Summons R. (2016) *Paleoproterozoic sterol biosynthesis and the rise of oxygen*. *Nature.* 543:420-423.
- Fournier GP**, Andam CP, Gogarten JP (2015) *Ancient Horizontal Gene Transfer and the Last Common Ancestors*. *BMC Evolutionary Biology.* 15:70 DOI: 10.1186/s12862-015-0350-0.
- Fournier GP**, Alm EJ (2015). *Ancestral Reconstruction of a Pre-LUCA Aminoacyl-tRNA Synthetase Ancestor Supports the Late Addition of Trp to the Genetic Code*. *Journal of Molecular Evolution.* 80(3-4):171-85.
- Rothman D, **Fournier GP**, French, KL, Alm EJ, Boyle, EA, Cao C, Summons RE (2014). *Methanogenic Burst in the End-Permian Carbon Cycle*. *Proceedings of the National Academy of Sciences USA.* 111(15):5462-7.
- Fournier GP**, Andam C, Alm EJ, Gogarten JP (2011). *Molecular evolution of synthetase proteins in the early history of life*. *Origins of Life and Evolution of Biospheres.* 41(6):621-632.
- Williams D, **Fournier GP***, Lapierre P, Swithers KS, Green AG, Andam CP, Gogarten JP. (2011). *A Rooted Net of Life*. *Biology Direct.* 6:45. *Equal first co-authorship
- Swithers KS, **Fournier GP**, Green AG, Gogarten JP, Lapierre P (2011). *Reassessment of the lineage fusion hypothesis for the origin of double membrane bacteria*. *PLoS One.* 6(8):e23774.
- Andam CP, **Fournier GP**, Gogarten JP (2011). *Multi-level populations and the evolution of antibiotic resistance through horizontal gene transfer*. *FEMS Microbiology Reviews.* 35(5):756-67.

- Fournier GP**, Dick AA, Williams D, Gogarten JP (2011). *Evolution of the Archaea: emerging views on origins and phylogeny*. Research in Microbiology. 162(1):92-98.
- Fournier GP**, Gogarten JP (2010). *Rooting the Ribosomal Tree of Life*. Mol Biol Evol. 27(8):1792-1801.
- Fournier GP**, Neumann JE, Gogarten JP (2010). *Inferring the Ancient History of the Translation Machinery and Genetic Code via Recapitulation of Ribosomal Subunit Assembly Orders*. PLoS One 5(3): e9437.
- Fournier GP** (2010): *Rooting the Tree of Life*. Chapter 6 in "Molecular Phylogeny of Organisms", Oren A and Papke T (eds.), Caister Academic Press.
- Swithers KS, Senejani AG, **Fournier GP**, Gogarten JP. (2009). *Conservation of Intron and Intein Insertion Sites: Implications for Life Histories of Parasitic Genetic Elements*. BMC Evolutionary Biology. 9:303.
- Swithers KS, Gogarten JP, **Fournier GP** (2009). *Trees in the Web of Life*. J. Biol 8(6):54.
- Fournier GP**, Huang J, Gogarten JP (2009). *Horizontal gene transfer from extinct and extant lineages: biological innovation and the coral of life*. Philosophical Transactions of the Royal Society B: Biological Sciences. 364, 2229-2239.
- Zhaxybayeva O, Swithers KS, Lapierre P, **Fournier GP**, Bickhart DM, DeBoy RT, Nelson KE, Nesbo CL, Doolittle WF, Gogarten JP, Noll KM (2009). *On the chimeric nature, thermophilic origin, and phylogenetic placement of the Thermotogales*. Proceedings of the National Academy of Sciences USA. 106(14):5865-5870.
- Fournier G** (2009). *Horizontal gene transfer and the evolution of methanogenic pathways*. Methods in Molecular Biology. 532:163-179.
- Fournier GP** (2009): *Horizontal Gene Transfer and the Evolution of Methanogenic Pathways*. Chapter 9 in "Horizontal Gene Transfer: Genomes in Flux" (Methods in Molecular Biology), Gogarten MB, Gogarten JP, Olendzenski LC (eds.), Humana Press.
- Fournier GP**, and Gogarten JP (2008). *Evolution of Acetoclastic Methanogenesis in Methanosarcina via Horizontal Gene Transfer from Cellulolytic Clostridia*. Journal of Bacteriology. 190 (3) 1124-1127.
- Gogarten JP, **Fournier G**, Zhaxybayeva O (2008). *Gene transfer and the reconstruction of life's early history from the molecular record*. Space Science Reviews. 135:115-131.
- Noonan EJ, **Fournier GP**, Hightower LE (2008). *Surface expression of Hsp70B' in response to proteasome inhibition in human colon cells*. Cell Stress Chaperones 13:105-110.
- Fournier GP** (2008): *Evolution of the Genetic Code: Computational Methods and Inferences*. Chapter 3 in "Computational Methods for Understanding Bacterial and Archaeal Genomes", Xu Y, Gogarten JP (eds.), Imperial College Press, London.
- Fournier GP**, Gogarten JP (2007). *Signature of a Primitive Genetic Code in Ancient Protein Lineages*. Journal of Molecular Evolution. 65(4):425-436.
- Wei J, Goldberg MB, Burland V, Venkatesan MM, Deng W, **Fournier G**, Mayhew GF, Plunkett G 3rd, Rose DJ, Darling A, Mau B, Perna NT, Payne SM, Runyen-Janecky LJ, Zhou S, Schwartz DC, Blattner FR. (2003). *Complete genome sequence and comparative genomics of Shigella flexneri serotype 2a strain 2457T*. Infection and Immunity. 71(5):2775-2786.

Pogue, BW, O'Hara JA, Goodwin IA, Wilmot CJ, **Fournier GP**, Akay AR, Swartz H (2002). *Tumor PO(2) changes during photodynamic therapy depend upon photosensitizer type and time after injection*. Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology. 132(1):177-184.

Professional Activities/Service (Internal)

2022-2023	Committee member, EAPS Tenure-track faculty search (Habitability)
2021-present	EAPS Department Lecture Series (DLS) Committee Chair, MIT
2020	Coach, Student Success Coaching Program, MIT
2020	Co-organizer/Instructor, WHOI/BIOS Microbial Oceanography Field Course, Bermuda, UK
2019	Lead organizer, Dating in Deep Time Workshop II, MIT, Cambridge MA.
2018	Featured in and assisted in producing MIT Graduate Program in Science Writing student documentary "How the Earth got its Oxygen"
2017-present	MIT EAPS Department Minor Advisor
2017	Faculty co-Leader/Organizer, MIT EAPS Crosby Newfoundland Field Trip
2017	Lecturer/Discussion Leader, "Intro to Astrobiology" MIT EAPS Department Seminar Series
2016-present	MIT EAPS Terrascope Freshman Advisor
2016-present	Joint Committee on Biological Oceanography, Woods Hole Joint Program
2016-present	MIT Microbiology Program, Admissions reviewer/interviewer
2016, 2018	Faculty Leader, MIT EAPS Department Western MA Geology Field Trip
2015	Faculty Leader, MIT Discover Earth, Atmospheric and Planetary Sciences (DEAPS) 2015 Trip, Yellowstone National Park, WY.
2015	Organizer, 2015 MIT EAPS IAP Lecture Series & Panel Session: The Origins of Life

Professional Activities/Service (External)

2022	Featured interview, NHK (Japan Public Television) Documentary Series " <i>Cosmic Front NEXT: Oxygen</i> "
2022	Science Advisor, BBC/NOVA Documentary Series, "Biography of our Earth"
2021	Review Editor, Frontiers in Microbiology: Microbial Physiology and Metabolism
2021	External Co-organizer & Co-chair, 2021 NeLLi Symposium on New Lineages of Life, DOE Joint Genome Institute

2020	Group Chief, NASA Grant Peer Review Panel, Interdisciplinary Consortia for Astrobiology Research (ICAR): “Primitive Cells to Multicellularity”
2022, 2019, 2015	Session Chair, Astrobiology Science Conference
2019	External Research Proposal reviewer for NERC Large Grant Scheme
2018	Proposal review panelist, NASA Exobiology Program
2017	Science Advisor, Geomicrobiology Documentary Film “The Most Unknown”
2017	Science Advisor, Nat. Geo. Documentary Film series “One Strange Rock”
2017	Lead organizer, Biogeochemical Dating in Deep Time Workshop, University of Connecticut, Storrs, CT
2016-2017	External Research Proposal reviewer for NASA Exobiology Program
2016	Session Chair, Society of Molecular Biology and Evolution Conference, Gold Coast, AUS.
2015-present	Investigator, Simons Foundation Collaboration on the Origins of Life
2014	Delegate, NASA/NSF/Smithsonian Institution Workshop, Beyond Habitability: Life and the Early Earth, Smithsonian Institution, Washington, DC
2014	Co-Chair, Round Table Workshop on the Origins of Life, ELSI Earth-Life Science Institute, Tokyo, Japan
2013	NASA Astrobiology Institute Strategic Plan Roadmap, Working Paper Contributor: “What were the genomic, metabolic, and ecological features of life at the root of the evolutionary tree?”
2011-2014	Member, NASA Astrobiology Institute Origin of Life Young Investigator Focus Group
2008	Panelist, Norman Hascoe Distinguished Lecture Series, University of Connecticut, Storrs, CT

White papers

Fournier GP, Gogarten JP, Goldman A, Petrov AS, Rothschild L, Segrè D, Smith E, Williams L. (2020) *Understanding the Early Major Transitions in Evolutionary History Part 2: Ancient Evolution of Biological Systems and the Biosphere*. Planetary Science Decadal Survey for White Papers, National Academies of Science, Engineering, and Medicine.

Goldman A, **Fournier GP**, Gogarten JP, Petrov AS, Rothschild L, Segrè D, Smith E, Williams L. (2020) *Understanding the Early Major Transitions in Evolutionary History Part 1: Stages in the Emergence of Complex Life*. Planetary Science Decadal Survey for White Papers, National Academies of Science, Engineering, and Medicine.

Outreach

2018, 2020	Organizer/Speaker, Boston Public Schools/Zoo New England “Darwin Day”
2015	Consultant/Expert Collaborator, PBS Nova Evolution Lab, Life on Earth project: NSF DRL AISL #1010889
2014	MIT Museum: Planets & Life, Human & Planetary Perspectives Panel and Discussion Session: “ <i>The Origin of Life: Top-down Evidence from Genes and Genomes</i> ”
2011	Co-organizer, Darwin Day Educational Outreach Program, Franklin Park Zoo, Boston MA

Courses Taught

Spring 2015, 2019-2022:	12.007: Geobiology
Fall 2015-2016, 2023:	1.87/7.493/12.493/20.446: Microbial Genetics and Evolution
Spring 2016:	12.S492: Problems in Early Life and Planetary History
Fall 2017, 2018, 2020, 2022:	12.178/12.478: The Phylogenomic Planetary Record
Spring 2017, alt. Fall 2019-2023:	12.177/12.477: Astrobiology: Origins and Early Evolution of Life
IAP 2018, 2020:	12.091/12.S593: Origin of Life Seminar Series

Current Students & Researchers Supervised

Fatima Husain, EAPS PhD student
Erik Tamre, EAPS PhD student
Chris Parsons, EAPS PhD student
Maddie Paoletti, EAPS PhD student
Jack Payette, EAPS PhD student

Past Student Lab Members—subsequent positions

Sarah Schwartz, Microbiology Program, PhD 2022—Postdoc, University of California, Berkeley
Maddie Paoletti, Honors Thesis Project, UROP, Wellesley College—PhD program, MIT EAPS
Jack Payette, Research Associate—PhD program, MIT EAPS
Elise Cutts, EAPS PhD student, 2nd generals project, MS, 2022
Haitao Shang, EAPS PhD student, 2nd generals project, PhD 2022—Postdoc, University of Oregon
Danielle Gruen, WHOI Joint Program graduate student, PhD 2018 —MD program, University of Pittsburg
Abigail Caron, EAPS Undergraduate Student, Graduated 2017 —PhD program, University of Chicago
Makayla Betts, EAPS graduate student, Graduated 2018 (Masters) —PhD program, Caltech
Cara Magnabosco, visiting graduate student, Princeton University, Graduated 2016 —Professor of Geobiology, ETH Zürich
Megan Xu, EAPS UROP, Summer-Fall 2020
Annika Gomez, Microbiology PhD rotation student, Fall 2018
Zicong Zhang, visiting summer graduate student, Tokyo Institute of Technology, Summer 2017
Karen Wu, UROP, Spring 2017
Emilie Emmanuelle, visiting Undergraduate International Student, Sao Paulo, Brazil. Summer 2016

Postdoctoral Mentoring—subsequent positions

L. Thiberio Rangel, Postdoctoral Associate, 2018-2021—Computational Biologist at Finch Therapeutics
Lily Momper, Crosby Postdoctoral Fellow, 2016-2018—Earth and Environmental Scientist at Exponent

Joanna Wolfe, Postdoctoral Associate, 2015-2018—Research Associate at Harvard Museum of Comparative Zoology

Thesis Committee Memberships

Jeanne Bloomberg (Joint Program)
Aleksandar Radakovic (Harvard Medical School, PhD program)
David Gellar-McGrath (Joint Program)
Evan Qu (Microbiology)
Caroline Rzucidlo (Joint Program)
Emilie Skoog (EAPS)
Irene Zhang (Microbiology)
Cory Berger (Joint Program)
Erik Tamre (EAPS)
Chris Parsons (EAPS)
Haitao Shang (EAPS)
Marissa Kellogg (Joint Program)
Jacob Scott Baker (Microbiology)
Sarah Schwartz (Microbiology)
Makayla Betts (EAPS)
Danielle Gruen (Joint Program)
Phil Arevalo (Civil/Environmental Engineering)
Laura Weber (Joint Program)
Megan May (Joint Program)