

**TRINITY L. HAMILTON**

Associate Professor  
 McKnight Presidential Fellow  
 Department of Plant and Microbial Biology  
 The BioTechnology Institute , Microbial and Plant Genomics Institute  
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**PROFESSIONAL PREPARATION**


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Montana State University	Ph.D.	Chemistry & Biochemistry	2012
Montana State University	B.S.	Chemistry & Biochemistry	2006
Montana State University	B.S.	Biology	2003

**APPOINTMENTS****UNIVERSITY OF MINNESOTA**


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Associate Professor			2021 - present
Department of Plant and Microbial Biology			
McKnight Presidential Fellow			2021 - 2024
Graduate Faculty Appointment:			
Plant and Microbial Biology (PMB)			
Microbial Engineering (MicE)			
Microbiology, Immunology, and Cancer Biology (MICaB)			
Earth and Environmental Sciences (EES)			

Assistant Professor			2017 - 2021
Department of Plant and Microbial Biology			

<b>UNIVERSITY OF CINCINNATI</b>			2015 - 2017
Assistant Professor			
Department of Biological Sciences			

<b>THE PENNSYLVANIA STATE UNIVERSITY</b>			2012 - 2014
NASA Astrobiology Institute Postdoctoral Fellow			
Department of Geosciences			

<b>MAX PLANCK INSTITUTE FOR MARINE MICROBIOLOGY</b>			2013
Visiting Scientist, Microsensor Group			

<b>MONTANA STATE UNIVERSITY</b>			2006 - 2012
PhD Research Assistantship			
Department of Chemistry and Biochemistry			
<i>Defining the ecological interactions that drove the evolution of biological nitrogen fixation</i>			

## PUBLICATIONS

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**Hamilton lab member.** \* Denotes graduate or undergraduate student advisee. # Corresponding author.

### *Unpublished Preprints*

Miller, J.B., Frisbee, M.D., **Hamilton, T.L.**, Liljedahl, A.K. Groundwater provides temporary resilience to alpine catchments in glacial retreat. In review at *Nature Geoscience*. Submitted October 2022. Preprint available at *Research Square*: <https://doi.org/10.21203/rs.3.rs-2204053/v1>

### *Peer-reviewed publications*

#### 2022

**Hamilton#**, T.L., Havig, J.R. (2022) Meet me in the middle: median temperatures impact cyanobacteria and photoautotrophy in eruptive Yellowstone hot springs. *mSystems*. 7:1. (doi: 0.1128/msystems.01450-21) Preprint available at *bioRxiv* doi: <https://doi.org/10.1101/2021.12.06.471526>

Tankersly, K.B., Dunning, N.P., Lentz, D.L., Carr, C., Grazioso, L., **Hamilton, T.L.**, Reese-Taylor, K. (2022) Interpreting  $\delta^{13}\text{C}$  Values Obtained on SOM from Maya Reservoirs. *North American Archaeologist*. 0. doi: 10.1177/01976931221146570.

Hotaling, S., Price\*, T.L., **Hamilton#**, T.L. (2022) Summer dynamics of microbial diversity on a mountain glacier. *mSphere*. 7:e0050322. (doi: 10.1128/msphere.00503-22). Preprint available at *bioRxiv* doi: <https://doi.org/10.1101/2022.06.04.494832>

Teece, B.L., Havig, J.R., George, S.C., **Hamilton, T.L.**, Baumgartner, R.J., Hartz, J., Van Kranendonk, M.J. (2022) Biogeochemistry of recently fossilized siliceous hot spring sinters from Yellowstone, USA. *Astrobiology*. 23: 2. (doi: 10.1089/ast.2022.0012).

Kees, E.D., Murugapiran, S.K., Bennett\*, A.C., **Hamilton#**, T.L. (2022) Distribution and genomic variation of thermophilic cyanobacteria in diverse microbial mats at the upper temperature limits of photosynthesis. *mSystems*. 7: e0031722. (doi: 10.1128/msystems.00317-22) Preprint available at *bioRxiv* doi: <https://biorxiv.org/cgi/content/short/2022.03.25.485844v1>

Bennett\*, A.C., Murugapiran, S., Kees, E.D., Sauer, H.M., **Hamilton#**, T.L. (2022) Temperature and Geographic Location Impact the Distribution and Diversity of Photoautotrophic Gene Variants in Alkaline Yellowstone Hot Springs. *Microbiology Spectrum*. 10: e0146521. (doi: <https://doi.org/10.1128/spectrum.01465-21>). Preprint available at *bioRxiv* doi: <https://doi.org/10.1101/2020.12.16.423123>

O'Beirne, M.D., Sparkes, R., **Hamilton, T.L.**, van Dongen, B.E., Gilhooly III, W.P., Werne, J.P. (2022) Characterization of diverse bacteriohopanepolyols in a permanently stratified, hyper-euxinic lake. *Organic Geochemistry*. 168: 104431. (doi: <https://doi.org/10.1016/j.orggeochem.2022.104431>)

Lentz, D.L., **Hamilton, T.L.**, Dunning, N.P., Jones, J.G., Reese-Taylor, K., Anaya Hernandez, A., Walker, D.S., Tepe, E.J., Carr, C., Brewer, J., Ruhl, T., Meyers, S.A., Vazquez, M., Golden, A., Weiss, A.A. (2022) Paleoeological Studies of the Ancient Maya Center of Yaxnohcah using analyses of pollen, environmental DNA and macroremains. *Frontiers in Ecology and Evolution*. 10: 868033. (doi: 10.3389/fevo.2022.868033).

Sauer\*, H.M., **Hamilton**#, T.L., Heathcote, A., Anderson, R., Umbanhower Jr., C.E. (2022) Lake sediment bacteria across and ecological gradient. *PLoS One*. 17: e0258079. (doi: <https://doi.org/10.1371/journal.pone.0258079>). Preprint available at bioRxiv doi: <https://www.biorxiv.org/content/10.1101/2021.09.20.461123v1>

## 2021

Hotaling, S., Lutz, S., Dial, R.J., Anesio, A.M., Benning, L.G., Fountain, A.G., Kelley, J.L., McCutcheon, J., Skiles, S.M., Takeuchi, N., **Hamilton**#, T.L. (2021) Biological albedo reduction on ice sheets, glaciers, and snowfields. *Earth Science Reviews*. 220: 103728 (doi: 10.1016/j.earscirev.2021.103728) Preprint available at *Earth ArXiv* (doi: <https://doi.org/10.31223/X58S3Z>)

Grettenberger, C.L., **Hamilton**#, T.L. (2021) Metagenome assembled genomes of novel taxa from AMD environments. *Applied and Environmental Microbiology*. 87: e00772-21. (doi: 10.1128/AEM.00772-21). Preprint available at *bioRxiv* (doi: <https://doi.org/10.1101/2020.07.02.185728>).

Lentz, D.L., **Hamilton**, T.L., Dunning, N.P., Tepe, E.J., Scarborough, V.L., Meters, S.A., Grazioso, L., Weiss, A.A. (2021) Environmental DNA Reveals Arboreal Cityscapes at the Ancient Maya Center of Tikal. *Scientific Reports*. 11:12725. (doi: 10.1038/s41598-021-91620-6)

Havig, J.R., Kuether, J.E., Gangidine, A., Schroeder, S., **Hamilton**, T.L. (2021) Hot Spring Microbial Community Elemental Composition: Hot Spring and Soil Inputs, and the Transition from Biocumulus to Sinter. *Astrobiology*. *In press*. (doi: 10.1089/AST.2019.2086)

Miller, J.M., Frisbee, M.D., **Hamilton**, T.L., **Murugapiran**, S.K. (2021) Recharge from glacial meltwater is critical for alpine springs and their microbiomes. *Environmental Research Letters*. 16: 064012. (doi: 10.1088/1748-9326/abf06b)

Thomas, S.C., Payne, D., Tamadonfar, K.O., Seymour, C.O., Jiao, J.-Y., **Murugapiran**, S.K., Lai, D., Lau, R., Bowen, B.P., Silva, L.P., Louie, K.B., Huntemann, M., Clum, A., Spunde, A., Pillay, M., Palaniappan, K., Varghese, N., Mikhailova, N., Chen, I.-M., Stamatis, D., Reddy, T.B.K., O'Malley, R., Daum, C., Shapiro, N., Ivanova, N., Kyrpides, N.C., Woyke, T., Eloë-Fadrosch, E., **Hamilton**, T.L., Dijkstra, P., Dodsworth, J.A., Northen, T.R., Li, W.-J., Hedlund, B.P. (2021) Genomics, Exometabolomics, and Metabolic Probing Reveal Conserved Proteolytic Metabolism of *Thermoflexus hugenholtzii* and Three Candidate Species From China and Japan. *Frontiers in Microbiology* 12: 632731. (doi: 10.3389/fmicb.2021.632731)

## 2020

**Bennett**\*, A.C., **Murugapiran**, S., **Hamilton**#, T.L., (2020) Temperature impacts community structure and function of phototrophic Chloroflexi and Cyanobacteria in two alkaline hot springs in Yellowstone National Park. *Environmental Microbiology Reports*. 12: 503-513. (doi: 10.1111/1758-2229.12863)

Lentz, D.L., **Hamilton**, T.L., Dunning, N.P., Scarborough, V.L., Luxton, T.P., Vonderheide, A., Tepe, E.J., Perfetta, C.J., Brunemann, J., Grazioso, L., Valdez, F., Weiss, A.A. Troubled Waters at Tikal: Evidence of Polluted Reservoirs at the Ancient Maya City. *Scientific Reports*. 10: 10316. (doi: 10.1038/s41598-020-67044-z)

Grettenberger, C., Havig, J.R., **Hamilton**#, T.L. (2020) Metabolic diversity and co-occurrence of multiple *Ferrovum* species at an acid mine drainage site. *BMC Microbiology* 20: 119. (doi: 10.1186/s12866-020-01768-w) Preprint available at *bioRxiv*: <https://www.biorxiv.org/content/10.1101/751859v1>

Mardani, S., McDaniel, R., Bleakley, B., **Hamilton, T.L.**, Salam, S., Amegblator, L. (2020) The effect of wood-chip bioreactors on transporting microbes and antibiotic resistance under different flow conditions and microbial communities. *Ecological Engineering*. 43S: 100017. (doi: <https://doi.org/10.1016/j.ecoena.2020.100017>)

**Hamilton#**, T.L., Havig, J.R. (2020) Inorganic carbon stimulates snow algae primary productivity. *The ISME Journal*. 14: 857-860. (doi: 0.1038/s41396-018-0048-6)

## 2019

**Hamilton#**, T.L., Corman, J., Havig, J.R. (2019) Carbon and nitrogen recycling during cyanoHABs in dreissenid invaded and non-invaded US midwestern lakes and reservoirs. *Hydrobiologia*. 847: 939-965.(doi: 10.1007/s10750-019-04157-1)

Berberich, M.E., Beaulieu, J.J., **Hamilton, T.L.**, Waldo, S., Buffam, I. (2019) Spatial variability of sediment methane production and methanogen communities within a eutrophic reservoir: Importance of organic matter source and quantity. *Limnology and Oceanography*. 65: 1336-1358. (doi: 10.1002/lno.11392)

Gangidine, A., Havig, J.R., Fike, D., Jones, C., **Hamilton, T.L.**, Czaja, A.D. (2019) Trace element concentrations in hydrothermal silica deposits as a potential biosignature. *Astrobiology*. 20: 4. (doi: 10.1089/ast.2018.1994)

**Hamilton#**, T.L., \***Bennett, A.C.**, **Murugapiran, S.**, Havig, J.R. (2019) Anoxygenic phototrophs span geochemical gradients and diverse morphologies in terrestrial geothermal springs. *mSystems* 4: e00498-19. (doi: 10.1128/mSystems.00498-19)

Holmes, C.J., Jennings, E.C., Gantz, J.D., Specht, D., Spangler, A.A., Denlinger, D.L., Lee Jr., R.E., **Hamilton, T.L.**, Benoit, J.B. (2019) The Antarctic mite, *Alaskozetes antarcticus*, shares bacterial microbiome community membership but not abundance between adults and tritonymphs. *Polar Biology*. 42: 2075. (doi: 10.1007/s00300-019-02582-5)

Jennings, E.C., Korthauer, M.W., **Hamilton, T.L.**, Benoit, J.B. (2019) Matrotrophic viviparity limits the microbial community until after birth in the cockroach, *Diploptera punctata*. *Ecology and Evolution*. 9: 10601-10614. (doi: 10.1002/ece3.5580)

Havig, J.R., **Hamilton, T.L.** (2019) Productivity and community composition of low biomass/high silica precipitation hot springs: a possible window to Earth's early biosphere? *Life*. 9: 64; doi:10.3390/life9030064

**Hamilton#**, T.L. (2019) The trouble with oxygen: The ecophysiology of extant phototrophs and implications for the evolution of oxygenic photosynthesis. *Free Radical Biology & Medicine*. 140: 233-249. (doi: 10.1016/j.freeradbiomed.2019.05.003) \*Invited Review\*

Havig, J.R., **Hamilton, T.L.** (2019) Cryptic oxygen oases: Hypolith photosynthesis in hydrothermal areas and implications for Archean surface oxidation. *Frontiers in Earth Science - Biogeoscience*. 7:15. (doi: 10.3389/feart.2019.00015)

Havig, J.R., **Hamilton, T.L.** (2019) Snow algae drive productivity and weathering at volcanic rock-hosted glaciers. *Geochimica et Cosmochimica Acta*. 247: 220–242. (doi: 10.1016/j.gca.2018.12.024)

**2018**

Mitchell, M.E., **Hamilton, T.L.**, Uebel, C., Hopfensperger, K., Buffam I. (2018) Nitrogen cycling players and processes in green (vegetated) roof ecosystems in the Midwestern United States. *Applied Soil Ecology*. 132: 114-125. (doi: 10.1016/j.apsoil.2018.08.007)

Rutledge, A.M., Horgan, B., Havig, J.R., Rampe, E.B., Scudder, N.A., **Hamilton, T.L.** (2018) Silica Dissolution and Precipitation in Glaciated Volcanic Environments and Implications for Mars. *Geophysical Research Letters*. 45: 15. (doi: 10.1029/2018GL078105)

Haas, S., de Beer, D., Fink, A., Klatt, J.M., McCauley, R.M., **Hamilton, T.L.**, Meyer, V., Kakuk, B., Macalady, J.L. (2018) Low-light Anoxygenic Photosynthesis and Fe-S-Biogeochemistry in a Microbial Mat. *Frontiers in Microbiology*. 9: 858. (doi: 0.3389/fmicb.2018.00858)

**Hamilton#**, **T.L.**, Klatt, J., de Beer, D., Macalady J.L. (2018) Cyanobacterial photosynthesis under sulfidic conditions - Insights from the isolate *Leptolyngbya* sp. strain hensonii. *The ISME Journal* 12, 568–584 (doi:10.1038/ismej.2017.193)

Havig, J.R., **Hamilton, T.L.**, McCormick, M.L., \*McClure, B., Sowers, T., Wegter, B., Kump, L.R. (2018) Water column and sediment carbon isotope geochemistry of permanently redox-stratified Fayetteville Green Lake, New York, USA: Carbon cycling and implications for the Paleoproterozoic ocean. *Limnology and Oceanography*. 63, 570-587. (doi: 10.1002/lno.10649)

Colman, D.R., Poudel, S., **Hamilton T.L.**, Havig, J.R., Selensky, M., Shock, E.L., Boyd, E.S. (2018) Geobiological feedbacks and the evolution of thermoacidophiles. *The ISME Journal*. 12, 225-236. (doi: 10.1038/ismej.2017.162)

**2017**

\***Schuler C.**, Havig, J.R., **Hamilton#**, **T.L.** (2017) Carbon fixation across geochemical gradients in the Greater Obsidian Pool Area. *Frontiers in Earth Science*. 5:97. (doi: 10.3389/feart.2017.00097)

**Hamilton#**, **T.L.**, Welander, P., Albrecht, H.L., Fulton, J.M., Schaperdoth, I., Bird, L., Summons, R., Freeman, K.H., Macalady, J.L. (2017) Microbial communities and organic biomarkers in a Proterozoic-analog sinkhole environment. *Geobiology*. 15: 784-797. (doi: 10.1111/gbi.12252)

Havig, J.R., **Hamilton, T.L.**, Bachan, A., Kump, L.R. (2017) Sulfur and carbon isotopic evidence for metabolic pathway evolution and a four-stepped Earth system progression across the Archean and Paleoproterozoic. *Earth-Science Reviews*. 174: 1-21. (doi: 10.1016/j.earscirev.2017.06.014)

Havig, J.R., Grettenberger, C., **Hamilton#**, **T.L.** (2017) Geochemistry and microbial community composition across a range of acid mine drainage impact and implications for the Neoproterozoic-Paleoproterozoic transition. *Journal of Geophysical Research: Biogeosciences*. 122: 1404–1422. (doi:10.1002/2016JG003594) \*\*Cover feature\*\*

Hotaling, S., Hood, E., **Hamilton#**, **T.L.** (2017) Microbial ecology of the alpine cryosphere: glaciers, subglacial environments, and meltwater streams. *Environmental Microbiology*. 19: 2935-2948. (doi: 10.1111/1462-2920.13766) \*Invited Review\*

de Beer, D., Weber, M., Chennu, A., **Hamilton, T.L.**, Lott, C., Macalady, J.L., Klatt, J. (2017) Oxygenic and anoxygenic photosynthesis in a microbial mat from an anoxic spring, Little Salt Spring. *Environmental Microbiology*. 19: 1251–1265. (doi: 10.1111/1462-2920.13654)

Therien, J.B., Artz, J.H., Poudel, S., **Hamilton, T.L.**, Liu, Z., Noone, S.M., Adams, M.W.W., King, P.W., Bryant, D.A., Boyd, E.S., Peters, J.W. (2017) The physiological functions and structural determinants of catalytic bias in the [FeFe]-hydrogenases of *Clostridium pasteurianum* strain W5. *Frontiers in Microbiology, Microbial Physiology and Metabolism*. 8:1305. (doi: 10.3389/fmicb.2017.01305)

**Hamilton<sup>#</sup>, T.L.**, Havig, J.R. (2017) Supraglacial primary productivity in glaciers on stratovolcanoes of the Pacific Northwest. *Geobiology*. 15: 280-295. (doi:10.1111/gbi.12219)

----- T.L. Hamilton begins assistant professorship at University of Minnesota -----

## 2016

Boyd, E.S., Yu, R.-Q., Barkay, T., **Hamilton, T.L.**, Baxter, B.K., Naftz, D.L., Marvin-DiPasquale, M. (2016) Effect of Salinity on Mercury Methylating Benthic Microbes and Their Activities in Great Salt Lake, Utah. *Science of the Total Environment*. 581-582: 495-506. (<http://dx.doi.org/10.1016/j.scitotenv.2016.12.157>)

Urschel, M.R., **Hamilton, T.L.**, Roden, E.R., Boyd, E.S. (2016) Substrate Preference, Uptake Kinetics, and Bioenergetics in a Facultatively Autotrophic, Thermoacidophilic Crenarchaeote. *FEMS Microbiology Ecology*. (doi: <http://dx.doi.org/10.1093/femsec/fiw069>)

**Hamilton<sup>#</sup>, T.L.**, Bovee R.J., Sattin S.R., Mohr, W., Gilhooly III, W.P., Lyons, Pearson, A., Macalady, J.L. (2016) Carbon and sulfur cycling below the chemocline in a meromictic lake and the identification of a novel taxonomic lineage in the FCB superphylum, *Candidatus Aegiribacteria*. 7:00598. *Frontiers in Microbiology*. (doi: 10.3389/fmicb.2016.00598)

**Hamilton<sup>#</sup>, T.L.**, Bryant, D.A., Macalady, J.L. (2016) The role of biology in planetary evolution: Cyanobacterial primary production in low oxygen Proterozoic oceans. *Environmental Microbiology*. 18: 325–340. (doi: 10.1111/1462-2920.13118) \*Invited Review\*

## 2015

Harrold, Z.R., Skidmore, M., **Hamilton, T.L.**, Desch, L., Amada, K., van Gelder, W., Roden, E., Boyd, E.S. (2015) Aerobic and anaerobic thiosulfate oxidation by a cold-adapted, subglacial chemoautotroph. *Applied and Environmental Microbiology*. 82:1486-1495. (doi: 10.1128/AEM.03398-15)

Telling, J., Boyd, E.S., Bone, N., Jones, E., Tranter, M., J.L., MacFarlane, Martin, P., Wadham, J., LaMarche-Gagnon, G., Skidmore, M.L., **Hamilton, T.L.**, Hill, E., Jackson, M., Hodgson, D.A. (2015) Rock comminution as a source of hydrogen for subglacial ecosystems. *Nature Geoscience*. 8, 851–855. (doi:10.1038/ngeo2533)

Mansor, M., **Hamilton, T.L.**, Fantle, M., Macalady, J.L. (2015) Metabolic diversity and ecological niches of *Achromatium* populations revealed with single-cell genomic sequencing. *Frontiers in Microbiology* 6:822. (doi: 10.3389/fmicb.2015.00822)

Havig, J., McCormick, M.L., **Hamilton, T.L.**, Kump, L.R. (2015) The behavior of biologically important trace elements across the oxic/euxinic transition of meromictic Fayetteville Green Lake, New York, USA. *Geochimica et Cosmochimica Acta*. **165**:389-406. (doi: 10.1016/j.gca.2015.06.024)

**Hamilton<sup>#</sup>, T.L.**, Jones, D.S., Schaperdoth, I., Macalady, J.L. (2015) Metagenomic insights into S(0) precipitation in a terrestrial subsurface lithoautotrophic ecosystem. *Frontiers in Microbiology* **5**:756. (doi: 10.3389/fmicb.2014.00756)

Boyd, E.S., Garcia Costas, A.M., **Hamilton, T.L.**, Mus, F., Peters, J.W. (2015) Evolution of molybdenum nitro-genase during the transition from anaerobic to aerobic metabolism. *Journal of Bacteriology*. (doi: 10.1128/JB.02611-14)

----- T.L. Hamilton begins assistant professorship at University of Cincinnati -----

## 2014

Boyd, E.S., **Hamilton T.L.**, Swanson, K.D., Howells, A.E., Baxter, B.K., Meuser, J.E., Posewitz, M.C., Peters, J.W. (2014). [FeFe]-Hydrogenase abundance and diversity along a vertical redox gradient in Great Salt Lake, USA. *International Journal of Molecular Sciences* **15**:21947-21966. (doi: 10.3390/ijms150x000x)

Boyd, E.S., **Hamilton, T.L.**, Havig, J.R., Skidmore, M., Shock, E.S. (2014) Chemolithotrophic primary production in a subglacial ecosystem. *Applied and Environmental Microbiology*. **80**: 6146-6132. (doi: 10.1128/AEM.01956-14)

**Hamilton<sup>#</sup>, T.L.**, Bovee, R.J., Thiel, V., Sattin, S.R., Mohr, W., Schaperdoth, I., Vogl K., Gilhooly III, W.P., Lyons, T.W., Tomsho, L.P., Schuster, S.C., Overmann, J., Bryant, D.A., Pearson, A., Macalady, J.L. (2014) Coupled reductive and oxidative sulfur cycling in the phototrophic plate of a meromictic lake. *Geobiology*. **12**: 451-468. (doi: 10.1111/gbi.12092)

**Hamilton, T.L.**, Koonce, E., Howells, A., Havig, J.R., Jewell, T., de la Torre, J., Peters, J.W., Boyd, E.S. (2014) Competition for ammonia influences the structure of chemotrophic communities in geothermal springs. *Applied and Environmental Microbiology* **80**: 653-661. (doi: 10.1128/AEM.02577-13)

## 2013

Macalady, J.L., **Hamilton, T.L.**, Grettenberger, C.L., Jones, D.S., Tsao, L.E., Burgos, W.D. (2013) Energy, ecology and the distribution of microbial life. *Philosophical Transactions of the Royal Society B* **368**: 1622. (doi: 10.1098/rstb.2012.0383)

Boyd, E.S., **Hamilton, T.L.**, Wang, J., He, L., Zhang, C.L. (2013) The role of tetraether lipid composition in the adaptation of thermophilic archaea to acidity. *Frontiers in Terrestrial Microbiology* **4**: 62. (doi: 10.3389/fmicb.2013.00062)

**Hamilton, T.L.**, Peters, J.W., Skidmore, M.L., Boyd, E.S. (2013) Molecular evidence for an active endogenous microbiome beneath glacial ice. *The ISME Journal* **7**: 1402-1412. (doi: 10.1038/ismej.2013.31)

## 2012

Duffus, B.R., **Hamilton, T.L.**, Shepard, E., Boyd, E.S., Peters, J.W., Broderick, J. B. (2012) Radical AdoMet Enzymes in Complex Inorganic Metal Cluster Biosynthesis. *Biochimica et Biophysica Acta (BBA)-Proteins and Proteomics* 1824: 1254-1263. (doi: 10.1016/j.bbapap.2012.01.002)

**Hamilton, T.L.**, Vogl, K., Bryant, D.A., Boyd, E.S., Peters, J.W. (2012) Environmental constraints define the distribution, composition, and evolution of chlorophototrophs in thermal features of Yellowstone National Park. *Geobiology* 10: 236-249. (doi: 10.1111/j.1472-4669.2011.00296.x)

## 2011

Peters, J.W., Boyd, E.S., **Hamilton, T.L.**, Rubio, L. (2011) Chapter 4: Biochemistry of Mo-Nitrogenase. In *Nitrogen Cycling in Bacteria: Molecular Analysis*. Ed. J.W.B. Moir. Norfolk: Caister Academic Press. (ISBN: hb978-1-904455-86-8)

Boyd, E.S., **Hamilton, T. L.**, Peters, J.W. (2011) An alternative path for the evolution of biological nitrogen fixation. *Frontiers in Microbiology* 2: 205. (doi: 10.3389/fmicb.2011.00205)

**Hamilton, T.L.**, Jacobson, M., Ludwig, M., Boyd, E.S., Bryant, D.A., Dean, D.R., Peters, J.W. (2011) Differential accumulation of *nif* structural gene mRNA in *Azotobacter vinelandii*. *Journal of Bacteriology* 193: 4534-4536. (doi: 10.1128/JB.05100-11)

**Hamilton, T.L.**, Ludwig, M., Dixon, R., Boyd, E.S., Dos Santos, P., Setubal, J.C., Bryant, D.A., Dean, D.R., Peters, J.W. (2011) Transcriptional profiling of nitrogen fixation in *Azotobacter vinelandii*. *Journal of Bacteriology* 193: 4477-4486. (doi: 10.1128/JB.05099-11) \*\*\**Journal Highlight, Microbe, October, 2011*\*\*\*

Boyd, E.S., Lange, R.K., Mitchell, A.C., Havig, J.R., **Hamilton, T.L.**, Lafrenière, M.J., Shock, E.L., Peters, J.W., Skidmore, M. (2011). Diversity, abundance, and potential activity of nitrifying and denitrifying microbial assemblages in a subglacial ecosystem. *Applied and Environmental Microbiology* 77: 4778-4787. (doi: 10.1128/AEM.00376-11)

**Hamilton, T.L.**, Boyd, E.S., Lange, R.K., Peters, J.W. (2011) Biological nitrogen fixation in acidic high temperature geothermal springs in Yellowstone National Park, Wyoming. *Environmental Microbiology* 13: 2204-2215. (doi: 10.1111/j.1462-2920.2011.02475.x)

**Hamilton, T.L.**, Boyd, E.S., Peters, J.W. (2011) Environmental constraints underpin the phylogenetic diversity of *nifH* in the Yellowstone Geothermal Complex. *Microbial Ecology* 61: 860-870. (doi: 10.1007/s00248-011-9824-9)

Boyd, E.S., Anbar, A.D., Miller, S., **Hamilton, T.L.**, Lavin, M., Peters, J.W. (2011) A late methanogen origin for molybdenum-dependent nitrogenase. *Geobiology* 9: 221-232. (doi: 10.1111/j.1472-4669.2011.00278.x)

Boyd, J.M., Endrizzi, J.A., **Hamilton, T.L.**, Downs, D.M., Peters, J.W. (2011) FAD binding by ApbE protein from *Salmonella enterica*: a new class of FAD binding proteins. *Journal of Bacteriology* 193: 887-895. (doi: 10.1128/JB.00730-10)

## 2010



Boyd, E.S., **Hamilton, T.L.**, Spear, J.R., Lavin, M., Peters, J.W. (2010) [FeFe]-hydrogenase In Yellowstone National Park: Evidence for dispersal limitation and phylogenetic niche conservation. *The ISME Journal* 4: 887-895. (doi: 10.1038/ismej.2010.76)

## 2008

Sarma, R, Barney, B.M., **Hamilton, T.L.**, Jones, A., Seefeldt, L.C., Peters, J.W. (2008) Crystal structure of the L protein of *Rhodobacter sphaeroides* light-independent protochlorophyllide reductase with MgADP bound: a homologue of the nitrogenase Fe protein. *Biochemistry* 47: 13004-13015. (doi: 10.1021/bi801058r)

## 2007

Taylor, R.M., Maaty, W.S., Lord, C.I., **Hamilton, T.**, Burritt, J.B., Bothner, B., Jesaitis, A.J. (2007) Cloning, sequence analysis and confirmation of derived gene sequences for three epitope-mapped monoclonal antibodies against human phagocyte flavocytochrome b. *Molecular Immunology* 44: 625-637. (doi: 10.1016/j.molimm.2005.10.022)

## GENOME ANNOUNCEMENTS

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Thiel T., Tank, M., Tomsho, L.P., Burhans, R., Gay, S.E., **Hamilton, T.L.**, Schuster, S.C., Bryant, D.A. (2017) Draft genome sequence of *Anoxybacillus ayderensis* strain MT-Cab (Firmicutes). *Genome Announc* 5: e00547-17. (doi: 10.1128/genomeA.00547-17)

Lincoln, S.A., **Hamilton, T.L.**, Juárez, A.G.V, Schedlerb, M., Macalady, J.L., Müller, R., Freeman, K.H. (2015) Draft genome sequence of the piezotolerant, crude oil-degrading bacterium *Rhodococcus qingshengii* strain TUHH-12. *Genome Announc* 3: e00268-15. (doi: 10.1128/genomeA.00268-15)

Thiel T., **Hamilton, T.L.**, Tomsho, L.P., Burhans, R., Gay, S.E., Ramaley, R.F., Schuster, S.C., Steinke, L.A., Bryant, D.A. (2014) Draft genome sequence of the moderately thermophilic bacterium *Schleiferia thermophila* strain Yellowstone (*Bacteroidetes*). *Genome Announc* 2: e00860-14. (doi: 10.1128/genomeA.00860-14)

Thiel T., **Hamilton, T.L.**, Tomsho, L.P., Burhans, R., Gay, S.E., Schuster, S.C., Ward, D.M., Bryant, D.A. (2014) Draft genome sequence of the filamentous anoxygenic phototrophic bacterium *Chloroflexus* sp. strain MS-G (*Chloroflexi*). *Genome Announc* 2: e00872-14.. (doi: 10.1128/genomeA.00872-14)

## PROCEEDINGS

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Miller, J.M., Frisbee, M.D., **Hamilton, T.L.** (2018) Does meltwater from alpine glaciers provide mountain-block recharge? A discussion of evolving conceptual models and methodological challenges. (SIMFAI-2018).

## INVITED SEMINARS

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Coevolution of Life & The Planet Webinar Series (University of Hamburg), January 2023

University of Minnesota, Build-a-Cell, December 2022

University of Washington, May 2022

Baylor University, April 2022

Purdue, March 2022

Truman State University, April 2021

Michigan Tech University, April 2021

Universität Tübingen, December 2020

Loyola University, November 2020  
Bristol Geobiology Seminar, October 2020  
UC San Diego, June 2020 \*postponed due to Covid-19\*  
University of Tennessee, March 2020  
Princeton, February 2020  
University of Minnesota - Ecology, Evolution, and Behavior, December 2019  
University of Minnesota - Plant Pathology, November 2019  
Harvard, March 2019  
MIT, December 2018  
UNLV, February 2018  
University of Minnesota - Earth and Environmental Sciences, May 2018  
Wright State University, March 2017  
University of Minnesota, Plant and Microbial Biology, February 2017  
Miami University, Department of Microbiology, November 2016  
University of Kentucky, Department of Biology, November 2015  
The Pennsylvania State University, Ecology Program, April 2015  
University of Cincinnati, Department of Biological Sciences, February 2014  
Colorado School of Mines, Department of Chemistry and Geochemistry, December 2013

#### **SELECT INVITED ABSTRACTS**

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- 2022: Gordon Research Conference on Geobiology. Ventura, CA. "Life at the extreme: photosynthesis and microbial diversity from geysers to snowfields"
- 2022: The 9th International Conference on Polar and Alpine Microbiology. Potsdam, Germany. Keynote. "Geomicrobiology of mid-latitude glaciers"
- 2022: Microbiology of the Built Environment Gordon Research Conference. Waterville Valley, NH. "Extremophiles models for microbial life indoors."
- 2022: The 39th Summer Symposium in Molecular Biology. State College, PA. "The trouble with oxygen: The ecophysiology of extant phototrophs and implications for the evolution of oxygenic photosynthesis."
- 2022: Geobiology Gordon Research Conference. Oxnard, CA. "Life at the extreme: photosynthesis and microbial diversity from geysers to snowfields"
- 2021: Mini-symposium on photosynthesis. UC-Davis. "Anoxygenic Photosynthesis in Cyanobacteria."
- 2020: KWI Frontiers in Karst: Sulfuric Acid Weathering. San Vittore, Italy. "The energy-yielding reactions of sulfur-dependent microbes." (postponed due to Covid-19)
- 2019: Astrobiology Science Conference 2019. Seattle, WA. "Anoxygenic Photosynthesis in Cyanobacteria."
- 2018: Symposium on Microbial Sulfur Metabolism (ISMSM-5). Vienna, Austria. "Cyanobacteria photosynthesis under sulfidic conditions."
- 2017: Geobiology Society Conference. Banff, Alberta, Canada. "Cyanobacterial photosynthesis under sulfidic conditions in a Proterozoic-analog sinkhole."
- 2017: 253rd American Chemical Society National Meeting and Exposition. San Francisco, CA. "Living on the edge: Model photoautotrophs from a Proterozoic ocean analog."
- 2016: American Geophysical Union Fall Meeting. San Francisco, CA. "Model photoautotrophs isolated from a Proterozoic ocean analog - aerobic life under anoxic conditions."
- 2015: American Geophysical Union Fall Meeting. San Francisco, CA. "Microbes in a bottle: Where model organisms and analog systems."
- 2015: Goldschmidt. Prague, Czech Republic. "Light-dependent primary productivity in a Proterozoic ocean analog."
- 2015: Astrobiology Science Conference, Chicago, IL. "Light-dependent primary productivity in a

- Proterozoic ocean analog.”
- 2014: Goldschmidt. Sacramento, CA. “A Metabolically Versatile Cyanobacterium and the Low-Oxygen Proterozoic World.”
- 2013: Polar and Alpine Microbiology. Big Sky, MT. “Molecular evidence for an active endogenous microbiome beneath glacial ice.”
- 2013: Goldschmidt. Florence, Italy. “2-Methyl Hopanoid Production and Anoxygenic Photosynthesis: A Model Early Earth Cyanobacteria Isolated from a Proterozoic Ocean Analog”
- 2011: Gordon Research Seminar. Ventura, CA. “Biological Nitrogen Fixation in the Yellowstone Geothermal Complex”

## RESEARCH GRANTS

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### **Current Awards**

**Collaborative Research: Testing for nutrient limitation in alpine snow algae ecosystems.** NSF, DEB, Ecosystem Science, Role: Co-PI (PI: Jim Elser). 01/01/2022 - 12/31/24. \$637K to Hamilton.

**NSFGEO-NERC:Collaborative Research: Chemistry and Biology under Low Flow Hydrologic Conditions Beneath the Greenland Ice Sheet Revealed through Naturally Emerging Subglacial Water.** NSF, Arctic Natural Systems, Role: Co-PI (PI: Kathy Licht). 07/01/2021 - 06/30/2024. \$275K to Hamilton.

**Collaborative Research: EAGER: Developing tools to assess the evolutionary implications of partial clonality in alpine snow algae.** NSF, DEB, Evolutionary Processes, Role: Co-PI (PI: S. Krueger-Hadfield). 03/31/2021 - 03/30/2023. \$54K to Hamilton.

**Anoxygenic Photosynthesis in Cyanobacteria.** NSF, Geobiology and Low-Temperature Geochemistry. Role: PI. 06/01/2020 to 05/31/2023. \$384K to Hamilton.

**Collaborative research: Cyanobacteria, Nitrogen Cycling, and Export Production in the Laurentian Great Lakes.** NSF, Division of Ocean Sciences, Chemical Oceanography. Role: CoPI (PI: J. Werne). 03/15/2020 to 02/28/2023. \$178K to Hamilton.

**The distribution and activity of metabolically diverse anoxygenic phototrophs across geochemical gradients in hydrothermal systems.** NASA Exobiology. Role: PI. 01-01-2020 to 12/31/2022. \$563K to Hamilton.

**Between a rock and a frozen place: Cold-based glacial chemical alteration of volcanic bedrock as an analog for Mars.** NASA Solar System Workings. Role: Collaborator. (PI: A. Rutledge). \$561K total (\$0 to UMN). 01/01/2020 to 12/31/2022.

**Collaborative Research: Quantifying the contribution of alpine glacier meltwater to mountain-block recharge using microbiological markers and environmental isotopes.** NSF, Division of Earth Sciences, Hydrologic Sciences. Role: Co-PI (PI: M. Frisbee). 07/15/2019 to 06/30/2022. \$191K to Hamilton.

**Think Globally, Sequence Locally: Enhancing Research and Teaching at Itasca Biological Station by Establishing On-Site Long Read Sequencing Capacity.** Itasca Seed Grant. PI. Role: PI. 05/01/2019 to 04/30/2021. \$65K to Hamilton.

### **Past External Awards**

*Some Liked it Hot: Searching for Early Life in Terrestrial Hot Springs*. Royal Society Te Apārangi Marsden Fund. Role: Collaborator (PI: K. Campbell). \$958K NZD (\$0 to UMN). 01-10-2018 to 12-31-2020.

*Characterizing the Link Between Algal Bloom Biomass and Methane Production in Ohio Reservoirs*. Ohio Water Resources Center (USGS). Role: Co-I (PI: I. Buffam). \$79K. 03-01-2017 to 02-28-2018.

*Contaminated Water and the Collapse of the Ancient Maya: Microbiome and Geochemical Analyses of Reservoir Sediments from Tikal*. NSF-Archaeology. Role: Co-I (PI: D. Lentz). \$35K. 07-01-2016 to 06-30-2017.

*The Role of Biology in Planetary Evolution: Microbial Primary Production in Proterozoic Oceans*. NASA Astrobiology Institute Postdoctoral Fellowship. 2013-2015.

### **Past Internal Awards**

*Life on ice - The role of microbiota in glacier ice worm adaptation and biogeography*. University of Cincinnati - University Research Council. Role: PI. \$6K. 03/01/2016 - 02/28/2017.

*Primary Productivity in Supraglacial Ecosystems*. UC LEAF. Role: PI. \$3K. 09/01/2015 - 08/31/2016.

### **RECENT HONORS AND EXTERNAL SERVICE**

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2021-2024	UMN McKnight Presidential Fellow
2021	Goldschmidt 2022 Theme Chair
2020-2022	Vice President, Geobiology & Geomicrobiology Division of GSA
2020	2020 Scialog Fellow
2018 - 2020	Treasurer, Geobiology & Geomicrobiology Division of GSA
2017 - present	Executive Board, Geobiology Society
2016	National Academy of Education Fellow in the Life Science
2015	Guest Associate Editor, <i>Frontiers in Microbiological Chemistry and Geomicrobiology</i> , Special Topic: Origin and Evolution of Photosynthesis
2013	NASA Astrobiology Institute Postdoctoral Fellow
2013	ASM Career Development Grant for Postdoctoral Women

### **EDITORSHIPS**

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2021 – present	Associate Editor, <i>Geobiology</i>
2021 – present	Editorial Board Member, <i>The ISME Journal</i>
2019 – present	Associate Editor, <i>Frontiers in Microbiological Chemistry and Geomicrobiology</i>
2017 – 2021	Editorial Advisory Board, <i>Geobiology</i>
2016	Guest Editor, <i>Frontiers in Microbiology</i> , Research Topic: Origin and Evolution of Photosynthesis

### **TEACHING**

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#### University of Minnesota

Microbial Ecology and Applied Microbiology - PMB 4121 (Spring 2021, Spring 2022, Spring 2023)  
Foundations in Biology - BIOL 2003 / BIOL 2003H (Spring 2020, Fall 2021, Fall 2022)  
Succeeding in Grad School: Skills, Ethics, and Beyond - PMB8081 (Fall 2019, Fall 2020)  
Molecular Biology and Society - BIOL 3020 (Fall 2018)

#### University of Cincinnati

Microbiome - BIOL8053001  
Molecular Biology - BIOL8003001  
Research Progress in Biology - BIOL9004002

## Seminar - BIOL9003001

**POSTDOCTORAL RESEARCHERS SUPERVISED/MENTORED**

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Pablo Almela	University of Minnesota, July 2022-present
Heather Fair	University of Minnesota, Sept. 2020-present
	NSF Postdoctoral Research Fellowship in Biology
Eric Kees	University of Minnesota, Sept. 2019-2022
Senthil Murugapiran	University of Minnesota, Feb. 2018-2021

**GRADUATE STUDENTS SUPERVISED/MENTORED**

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Chris Hansen (current)	Masters student, University of Minnesota
Teresa Mccarrell (current, NSF GRFP recipient)	PhD student, University of Minnesota
Hailey Sauer (current)	PhD student, University of Minnesota
Taylor Price (current)	PhD student, University of Minnesota
Anna Bennett (past)	PhD student, University of Minnesota
Jonathan Popovici (past)	PhD student, University of Cincinnati
Rupal Jain (past)	Masters student, University of Cincinnati
Randall Marshall (past)	PhD student, University of Cincinnati
Sam Klassen (past)	Masters student, University of Cincinnati

**FACULTY DEVELOPMENT ACTIVITIES REGARDING TEACHING**

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2019 HHMI Faculty Fellows for Inclusive Excellence Program – 2019-2020

National Academies Northstar Summer Institute on Undergraduate Science Education – June 2016

**EXAMPLES OF PUBLIC OUTREACH**

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Petri dish “Origin of Life” conversation — November 2021

Probable Meets Possible, When life gets weird, Bell Museum — October 2020

Bell Museum Earth Day — 2020

Yellowstone Caldera Chronicles — March 2020

Skype A Scientist – 2019, 2020

“Mars and Microbes” at SpaceFest at the Bell Museum – 2019

“Microbes on Mountains” at SciSpark 2018: Women in Science

Greater Cincinnati Water Works Board Member

Water quality monitoring with the Great Miami River Volunteer Water Quality Monitoring

Greenacres Saturday Stream Snapshot

Pennsylvania State University - Shake, Rattle, and Rocks

Montana State University - MSU Science Zone

Montana State University - Women in Science