

TRINITY L. HAMILTON

Assistant Professor
 Department of Plant and Microbial Biology
 The BioTechnology Institute, Microbial and Plant Genomics Institute
 University of Minnesota
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PROFESSIONAL PREPARATION

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	2017 - present
Assistant Professor	
Department of Plant and Microbial Biology	
Graduate Faculty Appointment:	
Plant and Microbial Biology (PMB)	
Microbial Engineering (MicE)	
Microbiology, Immunology, and Cancer Biology (MICaB)	
Earth and Environmental Sciences	
UNIVERSITY OF CINCINNATI	2015 - 2017
Assistant Professor	
Department of Biological Sciences	
THE PENNSYLVANIA STATE UNIVERSITY	2012 - 2014
NASA Astrobiology Institute Postdoctoral Fellow	
Department of Geosciences	
MAX PLANCK INSTITUTE FOR MARINE MICROBIOLOGY	2013
Visiting Scientist, Microsensor Group	
MONTANA STATE UNIVERSITY	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

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

Manuscripts Under Consideration or In Revision

Grettenberger, C.L., **Hamilton#**, **T.L.**. Metagenome assembled genomes of novel taxa from AMD environments. *Applied and Environmental Microbiology*. Submitted July 2020.

Havig, J.R., Kuether, J.E., Gangidine, A., Schroeder, S., **Hamilton, T.L.** Hot Spring Microbial Community Elemental Composition: Hot Spring and Soil Inputs, and the Transition from Biocumulus to Sinter. *Astrobiology*. Revision submitted October 2019.

Preprints

Grettenberger, C.L., **Hamilton**[#], **T.L.** Metagenome assembled genomes of novel taxa from AMD environments. *bioRxiv*: <https://doi.org/10.1101/2020.07.02.185728>)

Grettenberger, C., Havig, J.R., **Hamilton**[#], **T.L.** Intra-genus metabolic diversity facilitates co-occurrence of multiple *Ferrovum* species at an acid mine drainage site. *bioRxiv*: <https://www.biorxiv.org/content/10.1101/751859v1>

Peer-reviewed publications

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*. *In press*. (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*. *Accepted June 2020*.

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 woodchip bioreactors on transporting microbes and antibiotic resistance under different flow conditions and microbial communities. *Ecological Engineering*. *In press*. (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*. (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*. (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: Hypolithic 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: 10.3389/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) Geological 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#, **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)

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#, **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#, **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[#], 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 nitrogenase during the transition from anaerobic to aerobic metabolism. *Journal of Bacteriology*. (doi: 10.1128/JB.02611-14)

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/ijm-s150x000x)

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[#], 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 Ado-Met 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: hisb978-1-904455-86-8)

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

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

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

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

INVITED ABSTRACTS

* (Presentation by Hamilton unless noted as co-author)

- 2020: 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." (postponed due to Covid-19)
- 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

Current Awards

Anoxygenic Photosynthesis in Cyanobacteria. NSF, Geobiology and Low-Temperature Geochemistry. Role: PI. \$384K. 06/01/2019 to 05/31/2022.

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). \$178K to UMN. 03/15/2020 to 02/28/2023.

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

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). \$191K to UMN. 07/15/2019 to 06/30/2022.

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. \$65K. 05/01/2019 to 04/30/2021.

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.

Microbe-Mineral Interactions in Glaciated Basaltic Terrains. NASA Exobiology and Evolutionary Biology. Role: Co-PI (PI: M. Skidmore). \$466K. 06/01/2016 to 05/31/2019.

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

Proposal to the 2019 BTI Shared Equipment Grant (FluoroMax PlusC Spectrofluorometer system). Role: PI. \$34K. Awarded May 2019.

Proposal to the 2017 BTI Shared Equipment Grant (Gas chromatograph mass spectrometer (GCMS)). Role: Co-I (PI: S. Ishii). \$35K. Awarded January 2018.

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.

HONORS AND EXTERNAL SERVICE

2020	2020 Scialog Fellow (postponed due to Covid-19, scheduled for March 2021)
2018 - 2020	Treasurer, Geobiology & Geomicrobiology Division of GSA
2017 - 2019	Executive Board, Geobiology Society
2016	National Academy of Education Fellow in the Life Sciences
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
2012	Women in Science and Engineering Travel Grant
2012	Montana Institute on Ecosystems Graduate Fellow-Spring
2011	Poster award winner, <i>Thermophiles</i>
2010	Timothy Swager Travel Grant
2008 - 2010	NSF IGERT Fellowship
2008	MT INBRE Travel Award
2005	MT INBRE Summer Undergraduate Award
2004	MT INBRE Undergraduate Research Program

PROFESSIONAL ASSOCIATIONS

American Chemical Society (ACS)
 American Geophysical Union (AGU)
 American Society for Microbiology (ASM)
 Geological Society of America (GSA)
 International Society for Microbial Ecology (ISME)
 Sigma Xi

TEACHING

University of Minnesota

Foundations in Biology - BIOL 2003 / BIOL 2003H (Spring 2020)
 Succeeding in Grad School: Skills, Ethics, and Beyond - PMB8081 (Fall 2019)
 Molecular Biology and Society - BIOL 3020 (Fall 2018)

University of Cincinnati

Microbiome - BIOL8053001
 Molecular Biology - BIOL8003001
 Research Progress in Biology - BIOL9004002
 Seminar - BIOL9003001

FACULTY DEVELOPMENT ACTIVITIES REGARDING TEACHING

2019 HHMI Faculty Fellows for Inclusive Excellence Program – 2019-2020
 National Academies Northstar Summer Institute on Undergraduate Science Education – June 2016

SYNERGISTIC ACTIVITIES

Vice Chair – Geobiology Division of GSA, 2020 - present
 Geobiology Society Executive Board, 2017 - present
 Session co-convenor – GSA 2020 “New Advances in Geobiology”
 Session co-convenor – GSA 2019 “New Voices in Geobiology”
 Session co-convenor – Goldschmidt 2019 “Co-evolving life and environments through deep time”
 Treasurer – Geobiology Division of GSA, 2018 - 2020
 Editorial Board – *Geobiology*
 Associate Editor – *Microbiological Chemistry and Geomicrobiology*

Review Editor – *Frontiers in Extreme Microbiology*

Session co-convener – Goldschmidt 2018 “Biological Approaches and Modern Analogues for Reconstructing the Co-evolution of Early Life and its Environment”

Session co-convener – Goldschmidt 2017 “The importance of being enzymatic: microbial metabolic and isotopic processes”

Midwest Geobiology Symposium co-organizer – October, 2016

Session co-convener – AbSciCon 2015 “Phototrophic Life and Earth’s Redox Evolution”

Session co-convener – Goldschmidt 2014 “From Genes to Geochemistry”

Workshop panel speaker – Goldschmidt 2014 “Integrating Microbiology and Geochemistry”

Session co-convener – Goldschmidt 2013 “Phototrophic Life and Earth’s Redox Evolution”

AbGradCon 2011 co-organizer

EDUCATION AND PUBLIC OUTREACH

Bell Museum Earth Day – 2020 (postponed due to Covid-19)

Yellowstone Caldera Chronicles – March 2020

Skype A Scientist – 2019

“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

PEER REVIEW

Journal Manuscript Reviews

Science, Nature Geosciences, Nature Communications, Scientific Reports, PNAS, Applied and Environmental Microbiology, PeerJ, PLOS ONE, Frontiers in Microbiology, Chemical Geology, Geochimica et Cosmochimica Acta, mBio, mSystems, FEMS Microbiology, Journal of Applied Microbiology, Marine Environmental Research, Astrobiology, Microbial Ecology, International Journal of Astrobiology, BioScience, Geomicrobiology Journal, Geobiology, Environmental Microbiology, Environmental Research Letters, Microbes and Environments, Frontiers in Microbiology, Frontiers in Microbiological Chemistry and Geomicrobiology, Frontiers in Extreme Microbiology, Science of the Total Environment, Environmental Science and Technology, Algal Research, Computational Biology and Chemistry, Journal of Soils and Sediment

Grant Reviews

NSF Geobiology and Low Temperature Geochemistry, National Science Foundation, Antarctic Integrated System Science, NSF EPSCoR, NSF-GRFP, NSF CAREER, NASA Exobiology and Evolutionary Biology Program, NASA Earth and Space Science, NASA Planetary Protection, NASA PSTAR, NASA Habitable Worlds, NASA NESSF, Ohio Water Resources, Wisconsin Sea Grant, JGI Community Community Science Program, Natural Sciences and Engineering Research Council of Canada, Czech National Science Foundation, Swiss National Science Foundation

POSTDOCTORAL RESEARCHERS SUPERVISED/MENTORED

Eric Kees

University of Minnesota, Sept. 2019-present

Senthil Murugapiran

University of Minnesota, Feb. 2018-present

POST-DOCTORAL FELLOWS GRANTS AND AWARDS

Senthil Murugapiran, 2018 - present

4th Microbial Single Cell Genomics Workshop, Fall 2019

Minnesota Supercomputing Institute Research Exhibition Travel Award, \$1,000, Spring 2018

GRADUATE STUDENTS SUPERVISED/MENTORED

Teresa Mccarrell (current)	PhD student at the University of Minnesota
Hailey Sauer (current)	PhD student at the University of Minnesota
Taylor Price (current)	PhD student at the University of Minnesota
Anna Bennett (current)	PhD student at the University of Minnesota
Jonathan Popovici (past)	PhD student at the University of Cincinnati
Rupal Jain (past)	Masters student at the University of Cincinnati
Randall Marshall (past)	PhD student at the University of Cincinnati
Sam Klassen (past)	Masters student at the University of Cincinnati

STUDENT GRANTS AND AWARDS

Anna Bennett, PhD Candidate, 2018 - present
 2019 Microbial Diversity Course, Summer 2019
 2018 Itasca Director's Fellowship, \$5,000, 05/01/2018 - 04/30/2019
 MPGI Travel Grant, \$500, Spring 2019
 BTI Travel Grant, \$500, Spring 2019

Hailey Sauer, 2019-present
 Science Outreach and Communication Intern, Spring semester 2019
 2020 Itasca Director's Fellowship, \$5,000, 05/01/2020 - 04/30/2020

Teresa Mccarell
 2020-2021 DOVE Fellowship

UNDERGRADUATE, POST-BAC, AND HIGH SCHOOL STUDENTS SUPERVISED/MENTORED

University of Minnesota

John Eggenberger (current)
 Jenna Hovind
 Amanda Borowski
 Reed Grumann
 Garner Kohrell (PhD candidate at Maryland)
 Maisie Lenards
 Katie Quinn
 Blake Everett (PhD candidate at Northwestern)
 Isabel Voigt
 Madeline Cammack

University of Cincinnati

Katie Bretland (Masters program)
 Caleb Schuler (PhD candidate at the University of Tennessee)
 Richard Renko
 Courtney Motley
 Enna Selmanovic
 Ian Huffer
 Taiwo Oyadiran (Masters program)
 Rahul Patel (High school student at Walnut Hills High School)
 Elizabeth Johnson (High school student at Cincinnati Day School)

ADVISING COMMITTEE

Current

UMN

Dalton Leprich, Earth and Environmental Sciences (PhD expected Summer 2022)

Richard Martinez, MICaB (PhD expected Spring 2022)

Brianna Loeks-Johnson, Water Resources Science (PhD expected Spring 2022)

Josh Kuether, Earth and Environmental Sciences (PhD expected Spring 2022)

Megan Smith, MICaB (PhD expected Spring 2021)

Fernando Ferrer, Earth and Environmental Sciences (PhD expected Summer 2020)

External

Alex Golden (Biological Sciences, University of Cincinnati, PhD expected Spring 2022)

Amanda Labrado (Geological Sciences, University of Texas at El Paso, PhD expected Spring 2021)

Chris Holmes (Biological Sciences, University of Cincinnati, PhD expected Spring 2021)

Jordyn Miller (EAPS, Purdue University, PhD expected Fall 2020)

Elise Szuter (Biological Sciences, University of Cincinnati, PhD expected Summer 2020)

Past

Lisa Fazzino, MICaB (University of Minnesota, PhD awarded Summer 2020)

Andrew Gangidine (Geology, University of Cincinnati, PhD awarded Spring 2020)

Nicholas Randall (Coll of Contin & Prof Studies - Biological Sciences MBS, UMN, awarded Spring 2020)

Sara Handlon (Biological Sciences, University of Cincinnati, Masters, awarded Spring 2019)

Megan Berberich (Biological Sciences, University of Cincinnati, Masters, awarded Fall 2017)

Khaled Gazi (Biological Sciences, University of Cincinnati, Masters, awarded Fall 2017)

SUMMA HONORS THESIS READER

CBS Summa Honors Thesis Reader – 2019-2020

CBS Summa Honors Thesis Primary Reader – 2019-2020

CBS Summa Honors Thesis Reader – Spring 2019