

**TRINITY L. HAMILTON**  
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 Department of Plant and Microbial Biology  
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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**

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UNIVERSITY OF MINNESOTA 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	2017 - present
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UNIVERSITY OF CINCINNATI Assistant Professor Department of Biological Sciences	2015 - 2017
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THE PENNSYLVANIA STATE UNIVERSITY NASA Astrobiology Institute Postdoctoral Fellow Department of Geosciences	2012 - 2014
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MAX PLANCK INSTITUTE FOR MARINE MICROBIOLOGY Visiting Scientist, Microsensor Group	2013
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MONTANA STATE UNIVERSITY PhD Research Assistantship Department of Chemistry and Biochemistry <i>Defining the ecological interactions that drove the evolution of biological nitrogen fixation</i>	2006 - 2012
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### **PUBLICATIONS**

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

#### ***In Revision***

Mardani, S., McDaniel, R., Bleakley, B., **Hamilton, T.L.**, Salam, S., Ameglator, L. The effect of woodchip bioreactors on transporting microbes and antibiotic resistance under different flow conditions and microbial communities. *Ecological Engineering*. *Revision submitted November 2019.*

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.*

Grettenberger, C., Havig, J.R., **Hamilton**<sup>#</sup>, **T.L.** Metabolic diversity and co-occurrence of multiple *Ferrovum* species at an acid mine drainage site. *BMC Microbiology*. Revision submitted October 2019. Preprint available at *bioRxiv*: <https://www.biorxiv.org/content/10.1101/751859v1>

**Hamilton**<sup>#</sup>, **T.L.**, Corman, J., Havig, J.R. Carbon and nitrogen recycling during cyanoHABs in dreissenid invaded and non-invaded US midwestern lakes and reservoirs. *Hydrobiologia*. Revision submitted December 2019.

### Preprints

Grettenberger, C., Havig, J.R., **Hamilton**<sup>#</sup>, **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>

### 2019

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*. In press. (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*. In press. (doi: 10.1089/ast.2018.1994)

**Hamilton**<sup>#</sup>, **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**<sup>#</sup>, **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., Havig, J.R. (2018) Inorganic carbon stimulates snow algae primary productivity. *The ISME Journal*. In press. (doi: 0.1038/s41396-018-0048-6)
- 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)
- 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)
- 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**<sup>#</sup>, **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)

## 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 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/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 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**

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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 ABSTRACTS AND PRESENTATIONS (Last 2 years, see Archive at end of CV for full list)**

(presentation by Hamilton unless noted as co-author)

2019: Anoxygenic Photosynthesis in Cyanobacteria. AbSciCon 2019. Seattle, WA.

2018: Cyanobacterial photosynthesis under sulfidic conditions. 5th International Symposium on Microbial Sulfur Metabolism (ISMSM-5). Vienna, Austria.

2018: Early Detection of HABs. Harmful Algal Blooms in Minnesota Workshop. Minneapolis, Minnesota.

## **CONFERENCE PRESENTATIONS (Last 2 years, see Archive at end of CV for full list)**

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\* student advisee presenting author, member of the Hamilton lab

2019: Havig, J.R., Van Kranendonk, M., Campbell, K., **Hamilton, T.L.**, Djokic, T., Gangidine, A., Deamer, D., Damer, B. 150 years of Yellowstone hot spring research: Biogeosciences and the past, present, and future of 'warm little ponds'. Presented at 2019 Fall Meeting, AGU, San Francisco, CA

2019: Havig, J.R., **Hamilton, T.L.** Integrating geochemical, microbiological, and molecular techniques to characterize and constrain the role of snow algae in local and global biogeochemical cycles. Presented at 2019 Fall Meeting, AGU, San Francisco, CA.

2019: Kuether, J.E., **Hamilton, T.L.** Havig, J.R. Hydrothermal Hypoliths: A Comparison of Extremophilic Rock-Dwelling Microorganisms with Other Hydrothermal Photo- and Chemotrophic Communities Across Acidic and Alkaline pH Ranges. Presented at 2019 Fall Meeting, AGU, San Francisco, CA.

- 2019: **Murugapiran, S., Bennett, A., Hamilton, T.L.** Anoxygenic photosynthesis across geochemical space in Yellowstone National Park hot springs. Presented at the 4th Microbial Single Cell Genomics Workshop. Bigelow Laboratory for Ocean Sciences, ME.
- 2019: **Bennett, A., Murugapiran, S.,** Havig, J., **Hamilton, T.L.,** Phototrophic community distribution and morphology along a geo-thermal stream: Insights into both modern and ancient microbial ecology. Presented at the 2019 Annual Midwest Geobiology Symposium. St. Louis, MO.
- 2019: Kuether, J.E., **Hamilton, T.L.,** Havig, J.R. Hydrothermal Hypoliths: A Comparison of Extremophilic Rock-Dwelling Microorganisms with Other Hydrothermal Photo- and Chemotrophic Communities Across Acidic and Alkaline pH Ranges. Presented at the 2019 Annual Midwest Geobiology Symposium. St. Louis, MO.
- 2019: Penrose, L.K., Campbell, K.A., Rowe, M., Van Kranendonk, M., Havig, J., **Hamilton, T.L.,** Sriaporn, C., Handley, K., Nakamura, E. Terrestrial hot spring analogues for the origin of life? The role of mixing zones in hot springs at Tikitere, Lake Rotokawa, Parariki Stream, and Wai-O-Tapu, New Zealand. AbSciCon 2019. Seattle, WA.
- 2019: Nampijja, M., Byamakama, E., Bleakley, B., **Hamilton, T.L.,** Marzano, S. Cultivar and environment influence on epiphytic bacterial diversity on wheat seeds. American Phytopathology Society—Plant Health 2019. Cleveland, OH.
- 2019: **Hamilton, T.L., \*Price, T.L.,** Hotaling, S., Tronstad, L.M., Finn, D.S., Zeglin, L.H. Diverse microbial communities associated with ice, biofilms, and sediments in the high Teton Range. Society for Freshwater Science Annual Meeting 2019, Salt Lake City, UT.
- 2018: **Hamilton, T.L.,** Havig, J.R. Inorganic carbon addition stimulates snow algae primary productivity. Snow Algae Meeting 2018, Potsdam, Germany.
- 2018: **Murugapiran, S.,** Havig, J.R., **Hamilton, T.L.** Exploring the “microbial dark matter” through large-scale genomics. Presented at the 2018 Midwest Geobiology Symposium. Northwestern University, Evanston, IL.
- 2018: **Hamilton, T.L.,** Havig, J.R. Supraglacial phototrophic productivity and implications for Early earth and mars. Astrobiology Australasia Meeting. Rotorua, New Zealand.
- 2018: Lentz, D., **Hamilton, T.L.,** Dunning, N., Scarborough, V. Lowland Maya Agriculture, Arboriculture and Other Production Systems: Applications of Paleobotanical, Isotopic and Molecular Techniques. Society for Economic Botany/Society of Ethnobiology Annual Meeting. Florence, Italy.
- 2018: Rutledge, A.M., Horgan, B.H.N., Havig, J.R., Rampe, E.B., Scudder, N., **Hamilton, T.L.** Glacial Alteration as a Source of Amorphous Silica on Amazonian Mars. Mars Workshop on Amazonian and Present Day Climate. Lakewood, CO.
- 2018: Berberich, M.E., Beauliea, J.J., **Hamilton, T.L.,** Buffam, I. Spatial variability of methane production and methanogen communities within a eutrophic reservoir: evaluating the importance of organic matter source and quantity. ASLO 2018 Summer Meeting. Victoria, B.C., Canada.
- 2018: Havig, J.R., **Hamilton, T.L.** Potential Effect of Eutrophication-Induced Cyanobacterial Blooms and Invasive Mussel Species on Carbon Cycling and Burial in the Great Lakes Region Lakes and Reservoirs. 2018 GSA North-Central Annual Meeting, Ames, Iowa.

#### **PUBLISHED ABSTRACTS (Last 2 years, see Archive at end of CV for full list)**

\* student advisee presenting author, **member of the Hamilton lab**

- 2018: Miller, J.M., Frisbee, M.D., **Hamilton, T.L.** Identifying alpine glacier melt influenced springs in Mt. Hood National Forest and Glacier National Park using stable isotopes of water. Presented at the 2018 GSA Annual Meeting, Indianapolis, IN.
- 2018: **Bennett\*, A.C., Murugapiran, S.,** Havig, J.R., **Hamilton, T.L.** Phototrophic community distribution and morphology along a geothermal stream: Insights into both modern and ancient microbial ecology. Presented at the 2018 GSA Annual Meeting, Indianapolis, IN.



- 2018: **Hamilton, T.L., Murugapiran, S.**, Havig, J. Anoxygenic photosynthesis across temperature and pH space. Goldschmidt Abstracts, 2018. Presented at Goldschmidt, Boston, MA.
- 2018: Havig, J.R., **Hamilton, T.L.** Cryptic Oxygen Oases: Hypoliths oxygenic photosynthesis in hydrothermal areas as a model for continental oxidation before the GOE.. Goldschmidt Abstracts, 2018. Presented at Goldschmidt, Boston, MA.

## **INVITED SEMINARS**

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UC San Diego, June 2020  
 University of Tennessee, March 2020  
 Princeton, March 2020  
 University of Minnesota - Ecology, Evolution, and Behavior, December 2019  
 University of Minnesota - Plant Pathology, November 2019  
 Harvard, March 2019  
 MIT, December 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

## **RESEARCH GRANTS**

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### ***Current Awards***

**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.

**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.

### ***Past Awards***

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

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

Characterizing the Link Between Algal Bloom Biomass and Methane Production in Ohio Reservoirs. Ohio WRC (USGS 104(b)). 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.

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.

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

## **HONORS AND SERVICE**

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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, Frontiers in Microbiological Chemistry and Geomicrobiology, 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, Thermophiles
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**

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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**

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University of Minnesota

Foundations in Biology - BIOL 2003 (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

## Penn State University

Geosc 598 - Metagenomics Seminar  
Geosc 021 - Earth & Life  
Abiol 590 - Astrobiology Seminar

## **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

## **SYNERGISTIC ACTIVITIES**

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Session co-convener – Goldschmidt 2019 “Co-evolving life and environments through deep time”

Treasurer — Geobiology & Geomicrobiology Division of GSA, 2018 - 2020

Editorial Board – *Geobiology*

Associate Editor — Microbiological Chemistry and Geomicrobiology (specialty section of *Frontiers in Chemistry*, *Frontiers in Earth Science*, *Frontiers in Environmental Science* and *Frontiers in Microbiology*)

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**

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University of Cincinnati - Greater Cincinnati Water Works Board Member

University of Cincinnati - Water quality monitoring with the Great Miami River Volunteer Water Quality Monitoring, the Mill Creek Water Quality Monitoring and 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**

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### ***Journal Manuscript Reviews***

*Nature Geosciences, Nature Communications, Scientific Reports, PNAS, Applied and Environmental Microbiology, PeerJ, PLOS ONE, Frontiers in Microbiology, Chemical Geology, Geochimica et Cosmochimica Acta, 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, NSF EPSCoR, NSF-GRFP, NASA Exobiology and Evolutionary Biology Program, Ohio Water Resources, NASA Earth and Space Science, NASA Planetary Protection, NASA PSTAR, NASA Habitable Worlds, JGI Community Science Program

**POSTDOCTORAL RESEARCHERS SUPERVISED/MENTORED**

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Eric Kees	University of Minnesota, Sept. 2019-present
Senthil Murugapiran	University of Minnesota, Feb. 2018-present

**POST-DOCTORAL FELLOWS GRANTS AND AWARDS**

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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**

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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**

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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

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

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Amanda Borowski	University of Minnesota
Reed Grumann	University of Minnesota
Jenna Hovind	University of Minnesota
Garner Kohrell	University of Minnesota
Maisie Lenards	University of Minnesota
Katie Quinn	University of Minnesota
Blake Everett (past)	University of Minnesota
Isabel Voigt (past)	University of Minnesota
Madeline Cammack (past)	University of Minnesota
Katie Bretland (past)	University of Cincinnati
Caleb Schuler (past)	University of Cincinnati
Richard Renko (past)	University of Cincinnati
Courtney Motley (past)	University of Cincinnati
Enna Selmanovic (past)	University of Cincinnati
Ian Huffer (past)	University of Cincinnati
Taiwo Oyadiran (past)	University of Cincinnati
Rahul Patel (past)	High school student at Walnut Hills High School
Elizabeth Johnson (past)	High school student at Cincinnati Day School

## **ADVISING COMMITTEE**

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### **Current**

#### *UMN*

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)  
Lisa Fazzino, MICaB (PhD expected Spring 2020)

#### *External*

Amanda Labrado (Geological Sciences, University of Texas at El Paso, PhD expected Spring 2021)  
Andrew Gangidine (Geology, University of Cincinnati, PhD expected Spring 2021)  
Alex Golden (Biological Sciences, University of Cincinnati, PhD expected Spring 2021)  
Elise Szuter (Biological Sciences, University of Cincinnati, PhD expected Spring 2019)  
Jordyn Miller (Earth, Atmospheric, and Planetary Sciences, Purdue University, PhD expected Fall 2020)  
Chris Holmes (Biological Sciences, University of Cincinnati, PhD expected Spring 2020)

### **Past**

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 HONROS THESIS READER**

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CBS Summa Honors Thesis Primary Reader – 2019-2020  
CBS Summa Honors Thesis Reader – Spring 2019

## **RESEARCH FIELD SITES**

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Yellowstone National Park, WY, USA  
Green Lake, Fayetteville, NY, USA  
Little Salt Spring, North Port, FL  
Cascade Range, Pacific Northwest, USA  
Beartooth Pass, MT, USA  
Daniel Boone National Forest, KY, USA  
Great Lakes Basin, Ohio, US  
Iron Springs Bog, MN  
Geothermal Areas near Rotorua, New Zealand  
Medicine Bow Mountains, WY

**ARCHIVE****INVITED ABSTRACTS AND PRESENTATIONS**

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(presentation by Hamilton unless noted as co-author)

- 2018: Cyanobacterial photosynthesis under sulfidic conditions. 5th International Symposium on Microbial Sulfur Metabolism (ISMSM-5). Vienna, Austria.
- 2017: Cyanobacterial photosynthesis under sulfidic conditions in a Proterozoic-analog sinkhole. 1st Geobiology Society Conference. Banff, Alberta, Canada.
- 2017: Living on the edge: Model photoautotrophs from a Proterozoic ocean analog. 253rd American Chemical Society National Meeting and Exposition. San Francisco, CA.
- 2016: Model photoautotrophs isolated from a Proterozoic ocean analog - aerobic life under anoxic conditions. American Geophysical Union Fall Meeting. San Francisco, CA.
- 2015: Microbes in a bottle: Where model organisms and analog systems meet. American Geophysical Union. American Geophysical Union Fall Meeting. San Francisco, CA.
- 2015: Light-dependent primary productivity in a Proterozoic ocean analog. Goldschmidt. Prague, Czech Republic.
- 2014: A Metabolically Versatile Cyanobacterium and the Low- Oxygen Proterozoic World. Goldschmidt. Sacramento, CA.
- 2013: Molecular evidence for an active endogenous microbiome beneath glacial ice. Polar & Alpine Microbiology. Big Sky, MT.
- 2013: 2-Methyl Hopanoid Production and Anoxygenic Photosynthesis: A Model Early Earth Cyanobacteria Isolated from a Proterozoic Ocean Analog. Florence, Italy. August 2013.
- 2011: Biological Nitrogen Fixation in the Yellowstone Geothermal Complex. Bioinorganic Chemistry Gordon Research Seminar. Ventura, CA.

**CONFERENCE PRESENTATIONS**

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\* student advisee presenting author, **member of the Hamilton lab**

- 2019: Nampijja, M., Byamakama, E., Bleakley, B., **Hamilton, T.L.**, Marzano, S. Determining epiphytic bacteria diversity as influenced by cultivar and the environment. American Phytopathology Society 2019.
- 2018: **Hamilton, T.L.**, Havig, J.R. Inorganic carbon addition stimulates snow algae primary productivity. Snow Algae Meeting 2018, Potsdam, Germany.
- 2018: **Murugapiran, S.**, Havig, J.R., **Hamilton, T.L.** Exploring the “microbial dark matter” through large-scale genomics. Presented at the 2018 Midwest Geobiology Symposium. Northwestern University, Evanston, IL.
- 2018: Havig, J.R., **Hamilton, T.L.** Potential effects of eutrophication-induced cyanobacterial blooms and invasive mussel species on carbon cycling and sequestration in Great Lakes Region lakes and reservoirs. GSA North-Central - 52nd Annual Meeting. Ames, Iowa.
- 2017: Schuler\*, C.G., Havig, J.R., **Hamilton, T.L.** Relating Microbial Community Composition and Function to Morphology: Implications for Interpreting the Rock Record. Astrobiology Science Conference. Mesa, AZ.
- 2017: Colman, D.R., Poudel, S., **Hamilton, T.L.**, Havig, J.R., Selensky, M.J., Shock, E.L., Boyd, E.S. Oxygen and the Evolution of Thermoacidophiles. Astrobiology Science Conference, Mesa, AZ.
- 2017: Skidmore M.L., Mitchell, R., Steigmeyer, A., van Gelder, W., Dunham, E., Lindsay, M., **Hamilton, T.L.**, Boyd, E.S. Mineral Dependent Chemolithotrophy in Subglacial Systems. Astrobiology Science Conference, Mesa, AZ.
- 2017: Havig, J.R., Hamilton, T.L. Cryptic photosynthesis: A possible analog for early Earth and Mars. Astrobiology Science Conference, Mesa, AZ.

- 2017: **Sublett\*, H., Hamilton, T.L.**, Lentz, D. DNA Analyses of Reservoirs and Watersheds of the Ancient Maya City of Tikal. Undergraduate Research Conference. Cincinnati, OH.
- 2017: **Schuler\*, C.G.**, Havig, J.R., **Hamilton, T.L.** Carbon fixation across geochemical gradients in the Greater Obsidian Pool Area. Undergraduate Research Conference. Cincinnati, OH.
- 2017: Bretland\*, K.A., Havig, J., **Hamilton, T.L.** Life at the fringe: in situ characterization of the upper temperature limit of photosynthesis. Undergraduate Research Conference. Cincinnati, OH.
- 2017: Boucher, J., Havig, J.R., **Hamilton, T.L.**, Antonaopoulos, D.A., Koval, J., McCormick, M. mapping microbial community composition and geochemical gradients at high spatial resolution in a meromictic lake (Green Lake, Fayetteville, New York. 2017 NE/NC GSA Joint Section Meeting, Pittsburgh, PA.
- 2017: Havig, J.R., **Hamilton, T.L.**, McCormick, M., McClure, B., Sowers, T., Wegter, B., Kump, L.R. Water Column and Sediment Carbon Isotope Geochemistry of Permanently Redox-Stratified Fayetteville Green Lake, New York, USA. 2017 NE/NC GSA Joint Section Meeting, Pittsburgh, PA.
- 2017: **Hamilton, T.L.**, Klatt, J., Weber, M., Lott, C., Clark, C., de Beer, D., Macalady, J.L. Model Photoautotrophs Isolated from a Proterozoic Ocean Analog. 2017 NE/NC GSA Joint Section Meeting, Pittsburgh, PA.
- 2016: Havig, J.R., Grettenberger, C.L., **Hamilton, T.L.** Zombie Mines and Brain Biofilms: Acid Mine Drainage Impact and Implications for the Archean-Paleoproterozoic transition. GSA Annual Meeting, Denver, CO.
- 2016: **Oyadiran\*, T.**, Hamilton T.L. Trace Metal Availability and the Evolution of Biological Nitrogen Fixation. Undergraduate Research Conference. Cincinnati, OH.
- 2016: **Huffer\*, I., Hamilton, T.L.** Effect of Various Nitrogen Sources on Growth of Microcystis aeruginosa Strains. Undergraduate Research Conference. Cincinnati, OH.
- 2015: **Hamilton, T.L.** Weber, M., Lott, C., Clark, C., de Beer, D., Dron, A., Macalady, J.L. Light-dependent primary productivity in a Proterozoic ocean analog. Astrobiology Science Conference, Chicago, IL.
- 2015: **Hamilton, T.L.**, Jones, D.S., Tsao, L., Schaperdoth, I., Macalady, J.L. Metagenomic insights into S(0) precipitation in a terrestrial subsurface lithoautotrophic ecosystem. Hamilton T.L., Astrobiology Science Conference, Chicago, IL.

## **PUBLISHED ABSTRACTS**

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\* student advisee presenting author, **member of the Hamilton lab**

- 2018: **Hamilton, T.L.**, Murugapiran, S., Havig, J.R. Anoxygenic photosynthesis across temperature and pH space. Presented at Goldschmidt 2018, Boston, MA.
- 2018: Havig, J.R., **Hamilton, T.L.** Cryptic Oxygen Oases: Hypolithic Oxygenic Photosynthesis in Hydrothermal Areas as a Model for Continental Oxidation Before the GOE. Presented at Goldschmidt 2018, Boston, MA.
- 2017: **Hamilton, T.L.**, Havig, J.R. Inorganic carbon addition stimulates snow algae primary productivity. Abstract #B13K-05, presented at 2017 Fall Meeting, AGU, New Orleans, LA.
- 2017: Havig, J.R., **Hamilton, T.L.** Cryptic oxygen oases: Hypolithic photosynthesis in hydrothermal areas and implications for Archean surface oxidation. Abstract #V24A-02, presented at 2017 Fall Meeting, AGU, New Orleans, LA.
- 2017: Rutledge, A.M., Horgan, B.H.N., Havig, J.R., Rampe, E.B., Scudder, N., **Hamilton, T.L.** Glacial Chemical Alteration of Mars-Like Bedrock. Abstract #P35H-05, presented at 2017 Fall Meeting, AGU, New Orleans, LA.
- 2017: Rutledge, A.M., Horgan, B., Havig, J.R., Rampe, E.B., Scudder, N.A., **Hamilton, T.L.** Glacial Melt water as a Source of Amorphous Silica on Early Mars. Fourth International Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life. Abstract #1964, presented at the Lunar and Planetary Science Conference, The Woodlands, TX.

- 2016: Scudder, N.A., Horgan, B., Havig, J.R., Rutledge, A.M., Rampe, E.B., Scudder, N.A., **Hamilton, T.L.** Differentiating Hydrothermal, Pedogenic, and Glacial Weathering in a Cold Volcanic Mars-Analog Environment. Abstract #2973 presented at Lunar and Planetary Science Conference, The Woodlands, TX.
- 2016: **Hamilton, T.L.**, de Beer, D., Klatt, J., Weber, M., Lott, C., Chennu, A. Model photoautotrophs isolated from a Proterozoic ocean analog - aerobic life under anoxic conditions. Abstract #B43F-04, presented at 2016 Fall Meeting, AGU, San Francisco, CA.
- 2016: **Hamilton, T.L.**, Havig, J.R. Primary productivity of supraglacial snow algae communities on stratovolcanoes of the Pacific Northwest. Abstract #B44B-08, presented at 2016 Fall Meeting, AGU, San Francisco, CA.
- 2016: Berberich, M.B., Buffam, I.D., Beaulieu, J.J., **Hamilton, T.L.**, Waldo, S., Li, X. Effects of Algal-Derived Carbon on Sediment Methane Production in a Eutrophic Ohio Reservoir. Abstract #B23B-0576, presented at 2016 Fall Meeting, AGU, San Francisco, CA.
- 2015: **Hamilton, T.L.**, Weber, M., Lott, C., Clark, C., Bird, L., de Beer, D., Dron, A., Freeman, K., Macalady, J. Light-Dependent Primary Productivity in a Proterozoic Ocean Analog. Goldschmidt Abstracts, 2015 1156. Presented at Goldschmidt, Prague, Czech Republic.
- 2015: Gilhooly III, W., Werne, J.P., O'Beirne, M., Harris IV, J.H., Fouskas, F., Havig, J.R., **Hamilton, T.L.**, McCormick, M. Diurnal sulfur isotope patterns in a stratified euxinic lake. Abstract #B21A-0411, presented at 2016 Fall Meeting, AGU, San Francisco, CA.
- 2015: **Hamilton, T.L.**, Weber, M., Lott, C., Havig, J.R., Clark, C., Bird, L.R., de Beer, D., Dron, A., Freeman, K.H., Macalady, J.L. Microbes in a bottle: Where model organisms and analog systems meet. Abstract #B24A-01, presented at 2015 Fall Meeting, AGU, San Francisco, CA.
- 2014: **Hamilton, T.L.**, Klatt, J., Bird, L., Freeman, K., de Beer, D., Macalady, J. A Metabolically Versatile Cyanobacterium and the Low-Oxygen Proterozoic World. Goldschmidt Abstracts, 2014 902. Presented at Goldschmidt, Sacramento, CA.
- 2014: Havig, J., **Hamilton, T.L.**, Bachan, A. Interpreting the Ancient Sulfur-Isotopic Signal from a Metabolic Pathway Perspective. Goldschmidt Abstracts, 2014 933. Presented at Goldschmidt, Sacramento, CA.
- 2014: **Hamilton, T.L.**, Jewell, T.N.M., de la Torre, J.R., Boyd, E.S. The Co-Distribution of Nitrifying Archaea and Diazotrophic Bacteria in Geothermal Springs. Abstract #B23D-0231, presented at 2014 Fall Meeting, AGU, San Francisco, CA.
- 2013: **Hamilton, T.L.**, Bird, L., Freeman, K., Macalady, J. 2-Methyl Hopanoid Production and Anoxygenic Photosynthesis: A Model Cyanobacteria Isolated from a Proterozoic Ocean Analog. Mineralogical Magazine, 77(5) 1249. Presented at Goldschmidt 2013, Florence, Italy.
- 2013: Boyd, E., **Hamilton, T.L.**, Spots, T., Dore, J., Canovas, P., Havig, J., Peters, J., Shock, E., Skidmore, M. Seasonal Variation in Biological Methane Production in a Subglacial Ecosystem. Mineralogical Magazine, 77(5) 758. Presented at Goldschmidt 2013, Florence, Italy.
- 2013: McClure, B.E., Havig, J.R., Sowers, T.A., **Hamilton, T.L.**, McCormick, M., Kump, L.R. Dynamics of the methane profile through the water column of meromictic Fayetteville Green Lake, N.Y. Abstract #B13E-0553, presented at 2013 Fall Meeting, AGU, San Francisco, CA.
- 2013: Boyd, E.S., **Hamilton, T.L.**, Havig, J.R., Lange, R., Murter, E., Skidmore, M.L., Shock, E. Coupling autotrophic sulfide mineral weathering with dolomite dissolution in a subglacial ecosystem. Abstract #OS53A-1685, presented at 2015 Fall Meeting, AGU, San Francisco, CA.
- 2012: **Hamilton, T.L.**, Peters, J., Boyd, E.S. Competition for Ammonia Structures the Composition of a Hydrothermal Microbial Community. Abstract #B44B-04, presented at 2012 Fall Meeting, AGU, San Francisco, CA.



- 2012: Boyd, E.S., **Hamilton, T.L.**, Skidmore, M.L., Peters, J.W. Comparing and Contrasting the Active Component of Subglacial and Supraglacial Microbial Communities Through Transcriptional Analyses. Abstract #C23E-08, presented at 2012 Fall Meeting, AGU, San Francisco, CA.
- 2012: Havig, J.R., **Hamilton, T.L.**, Boyd, E.S., Meyer-Dombard, D.R., Shock, E. Geochemical and physical drivers of microbial community structure in hot spring ecosystems. Abstract #B51D-0590, presented at 2012 Fall Meeting, AGU, San Francisco, CA.
- 2012: Peters, J., Boyd, E.S., **Hamilton, T.L.** The Role of Oxygen in the Evolution of Molybdenum Nitrogenase. Abstract #B43A-0387, presented at 2012 Fall Meeting, AGU, San Francisco, CA.
- 2011: **Hamilton, T.L.**, Havig, J.R., Boyd, E.S., Meyer-Dombard, D.R., Shock, E., Peters, J. A shift in microbial community composition as a result of a natural temporal change in in a hot spring ecosystem. Abstract #B31K-02, presented at 2011 Fall Meeting, AGU, San Francisco, CA.
- 2011: Skidmore, M.L., Boyd, E.S., Lange, R.K., Mitchell, A.C., Havig, J.R., **Hamilton, T.L.**, Lafreniere, M.J., Shock, E., Peters, J. Diversity, Abundance, and Potential Activity of Nitrifying and Nitrate-Reducing Microbial Assemblages in a Subglacial Ecosystem. Abstract #B22A-02, presented at 2011 Fall Meeting, AGU, San Francisco, CA.
- 2011: Havig, J.R., **Hamilton, T.L.**, Boyd, E.S., Meyer-Dombard, D.R., Shock, E. Effects of geochemical changes on microbial community structure in a hot spring ecosystem. Abstract #B31K-01, presented at 2011 Fall Meeting, AGU, San Francisco, CA.
- 2011: Boyd, E.S., **Hamilton, T.L.**, He, L., Wang, J., Peters, J., Zhang, C. Quantitative Mapping of Archaeal Biodiversity on the Geochemical Landscape in Yellowstone National Park, Wyoming. Abstract #B51G-0497, presented at 2011 Fall Meeting, AGU, San Francisco, CA.
- 2011: Peters, J., Boyd, E.S., **Hamilton, T.L.** Probing the evolution of biological nitrogen fixation by examining phylogenetic relationships of nitrogen fixation genes related by gene duplication. Abstract #B41B-0217, presented at 2011 Fall Meeting, AGU, San Francisco, CA.
- 2010: Boyd, E.S., **Hamilton, T.L.**, Peters, J.W. Environmental Constraints on the Distribution, Diversity, and Activity of Biological Nitrogen Fixation in the Yellowstone Geothermal Complex. Abstract #B41L-06, presented at 2010 Fall Meeting, AGU, San Francisco, CA.
- 2009: Boyd, E.S., Miller, S., **Hamilton, T.L.**, Lavin, M., Peters, J. A Methanogenic Origin for Molybdenum-Nitrogenase. Abstract #B12A-04, presented at 2010 Fall Meeting, AGU, San Francisco, CA.