Jesse C. McNichol

AHF 230, UPC campus, USC
Los Angeles, CA, USA

(213) 431-9402 (cell)
mcnichol@alum.mit.edu
jcmcnch.github.io

Education

Massachusetts Institute of Technology - Woods Hole Oceanographic Institution, Cambridge/Woods Hole, Massachusetts, USA
Ph.D., Biological Oceanography 2011–2016
- Cumulative GPA: 4.4/5.0
- Thesis: Productivity, Metabolism and Physiology of Free-Living Chemoautotrophic *Epsilonproteobacteria*
- Advisor: Dr. Stefan M. Sievert

Mount Allison University, Sackville, New Brunswick, Canada
Bachelor of Science, First Class Honours with Distinction, Biology 2003-2008
- Cumulative GPA: 3.8/4.0; Minor in Chinese Studies
- Honours Thesis: Endophytic Fungi of Liverworts (*Bryophyta*) in a Copper-Contaminated Environment
- Advisors: Dr. Felix J. Bärolocher and Dr. Robert Thompson

Professional Experience

University of Southern California, Fuhrman Lab; Los Angeles, CA, USA
Postdoctoral Scholar - Research Associate January 2018 - present
- Compiling an atlas of microbial biogeography based on meta-'omics datasets
- Using metagenomics/metatranscriptomics to infer physiological characteristics of natural microbial communities

Chinese University of Hong Kong, Luo Lab; Shatin, New Territories, HK
Research Assistant November 2016 - Nov 2017
- Isolated sulfur-oxidizing microorganisms from hydrothermal vents and coastal sediments
- Tested various substrate combinations for selective enrichment of roseobacter-group bacteria from local sediments

Woods Hole Oceanographic Institution, Sievert Lab; Woods Hole, MA, USA
Guest Investigator November 2016 - present
- Studying the population genetics of a collection of 9 *Sulfurovum* single-cell genomes sampled in 2008 and again in 2014 from the same deep-sea study site

Woods Hole Oceanographic Institution, Sievert Lab; Woods Hole, MA, USA
Graduate Research Assistant 2011-2016
- Studied the biogeochemistry/ecophysiology of autotrophic *Epsilonproteobacteria* in the field at deep-sea hydrothermal vents using incubations at *in situ* pressure and temperature
- Cultivated *Sulfurimonas denitrificans* in a custom-built chemostat to validate a theoretical model of energy conservation for this organism

National Research Council of Canada; Halifax, NS, Canada
Technical Officer, National Bioproducts Program 2009-2011
- Cultivated and harvested kilogram quantities of microalgal biomass
- Developed protocols for lipid extraction from microalgae
- Isolated pure cultures of microalgae from environmental samples

Environment Canada; Moncton, NB, Canada
Environmental Technician, Atlantic Lab for Environmental Testing 2009
- Conducted toxicology assays and counted sea urchin larvae microscopically

Atlantic Canada Conservation Data Center; Sackville, NB, Canada
Assistant Field Botanist 2008
- Identified native flora in the field, with an emphasis on rare species

Marine Macroecology and Biogeochemistry Lab (Finkel Lab); Sackville, NB, Canada
Summer Research Student 2007-2008
- Quantified iron accumulation in *Cyanobacteria* grown under high and low light

Teaching Experience

Woods Hole Oceanographic Institution; Woods Hole, MA, USA
Graduate Teaching Assistant

Biological Oceanography
(Spring 2015 with Dr. Lauren Mullineaux and Dr. Stace Beaulieu)
- Taught two classes on microbial biogeochemistry and metabolism
- Marked assignments, developed exam questions, and held weekly review session

Marine Microbiology and Biogeochemistry
(Fall 2013 with Dr. Stefan Sievert and Dr. Amy Apprill)
- Taught class on coupling microbial identity to function
- Marked assignments, developed exam questions, and held weekly review session

Mount Allison University; Sackville, NB, Canada
Teaching Assistant

Native Flora
(Fall 2007 with Dr. Robert Thompson)
- Assisted students to identify vascular plant species in the field

Mentoring Experience

(Jan 2018 - present): Assisted Fuhrman lab students implementing a qiime2 workflow for the analysis of PCR amplicon data.
(May 2017 - May 2018, CUHK): Guided the final-year undergraduate project of Annie Wing-Yi Lo, which tested the effect of microoxic conditions on the isolation of sulfur-oxidizing microbes from shallow-water hydrothermal vents.
(2015-2016, WHOI): Supervised the independent research project of volunteer Dali Smolsky to isolate novel autotrophic *Epsilonproteobacteria* from salt marsh and hydrothermal vent environments.

(**2010, NRC**): Taught students techniques for lipid extraction and transesterification of microalgal biomass with bio-compatible solvents.

Publications

Yeh, Y.C.*, **McNichol, J.***, Fichot, E., Needham, D., and Fuhrman, J., 2019. Comprehensive single-PCR 16S & 18S rRNA community analysis validated with mock communities and metagenomes. In preparation. *Co-first authors.

McNichol, J., Sievert, S.M., 2019. Reconciling a Model of Core Metabolism with Growth Yield Predicts Biochemical Mechanisms and Efficiency for a Versatile Chemoautotroph. Submitted for peer review.

Götz, F., Pjevac, P., Markert, S., **McNichol, J.**, Becher, D., Schweder, T., Mussmann, M., Sievert, S.M., 2019. Transcriptomic and proteomic insight into the mechanism of cyclooctasulfur- versus thiosulfate-oxidation by the chemolithoautotroph *Sulfurimonas denitrificans*. Environmental Microbiology 21, 244–258.

Labonté, J.M., Pachiadaki, M., Fergusson, E., **McNichol, J.**, Grosche, A., Gulmann, L.K., Vetriani, C., Sievert, S.M., Stepanauskas, R., 2019. Single Cell Genomics-Based Analysis of Gene Content and Expression of Prophages in a Diffuse-Flow Deep-Sea Hydrothermal System. Frontiers in Microbiology. 10.

McNichol, J., Stryhanyuk, H., Sylva, S.P., Thomas, F., Musat, N., Seewald, J.S., Sievert, S.M., 2018. Primary Productivity Below the Seafloor at Deep-Sea Hot Springs. Proceedings of the National Academy of Sciences. 201804351.

Götz, F., Longnecker, K., Soule, M.C.K., Becker, K.W., **McNichol, J.**, Kujawinski, E.B., Sievert., S.M., 2018. Targeted metabolomics reveals proline as a major osmolyte in the chemolithoautotroph *Sulfurimonas denitrificans*. Microbiology Open e586.

McNichol, J., Sylva, S.P., Thomas, F., Taylor, C.D., Sievert, S.M., Seewald, J.S., 2016. Assessing microbial processes in deep-sea hydrothermal systems by incubation at *in situ* temperature and pressure. Deep Sea Research Part I: Oceanographic Research Papers 115, 221–232.

McNichol, J., MacDougall, K.M., Melanson, J.E., McGinn, P.J., 2012. Suitability of soxhlet extraction to quantify microalgal fatty acids as determined by comparison with *in situ* transesterification. Lipids 47, 1–13.

McNichol, J., McGinn, P.J., 2012. Adapting Mass Algaculture for a Northern Climate, in: Gordon, R., Seckbach, J. (Eds.), The Science of Algal Fuels, Cellular Origin, Life in Extreme Habitats and Astrobiology. Springer Netherlands, pp. 131–146.

McNichol, J., Gordon, R., 2012. Are We from Outer Space?: A Critical Review of the Panspermia Hypothesis, in: Seckbach, J. (Ed.), Genesis - In The Beginning, Cellular Origin, Life in Extreme Habitats and Astrobiology. Springer Netherlands, pp. 591–619.

MacDougall, K.M., **McNichol, J.**, McGinn, P.J., O'Leary, S.J.B., Melanson, J.E., 2011. Triacylglycerol profiling of microalgae strains for biofuel feedstock by liquid chromatography–high-resolution mass spectrometry. Anal Bioanal Chem 401, 2609–2616.

Park, K.C., Whitney, C., **McNichol, J.**, Dickinson, K.E., MacQuarrie, S., Skrupski, B.P., Zou, J., Wilson, K.E., O'Leary, S.J.B., McGinn, P.J., 2011. Mixotrophic and photoautotrophic cultivation of 14 microalgae isolates from Saskatchewan, Canada: potential applications for wastewater remediation for biofuel production. J Appl Phycol 24, 339–348.

McNichol, J., 2008. Primordial soup, fool's gold, and spontaneous generation. Biochem Mol Biol Educ 36, 255–261.

Technical Comments

McNichol, J., Sievert, S.M. Comment on PMID 26929299: Carbon Fixation Driven by Molecular Hydrogen Results in Chemolithoautotrophically Enhanced Growth of *Helicobacter pylori*. In: PubMed Commons [Internet]. Bethesda (MD): National Library of Medicine; 2017 Feb 16. Available from: Permalink

Grants & Fellowships

JGI Small-Scale Microbial/Metagenome Program
Investigating the Genetic Basis of Differential Oxygen Tolerance in Sulfurimonas *Ecotypes from the Subseafloor Biosphere Using Single-Cell Genomics* (502884)
2016

NASA Earth Systems Science Fellowship
Quantifying Energy Metabolism and Associating Function with Taxonomy for Chemosynthetic Microbial Communities at Deep-Sea Hydrothermal Vents (PLANET14F-0075)
2014-2016

Natural Sciences and Engineering Research Council of Canada, Post-Graduate Scholarship (Doctoral level)
Quantifying Energy Metabolism and Associating Function with Taxonomy for Chemolithoautotrophic Microbial Communities at Deep-Sea Hydrothermal Vents (PGSD3-439487-2013)
2013-2016

Canadian Meteorological and Oceanographic Society Scholarship Supplement
2013-2014

Natural Sciences and Engineering Research Council of Canada, Post-Graduate Scholarship (Master's level)
Psycrophilic bacteria in the Canadian Arctic (PGSM-405117-2011)
2011-2012

Invited Talks

The Swire Institute of Marine Science; Hong Kong S.A.R., China
Brimstone Bacteria: Primary Productivity and Microbial Ecology of Deep-Sea Hydrothermal Vents Mar 20th, 2016

University of Hong Kong, School of Biological Sciences; Hong Kong S.A.R., China
Brimstone Bacteria: Primary Productivity and Microbial Ecology of Deep-Sea Hydrothermal Vents Jan 29th, 2016

Max Planck Institute for Marine Microbiology; Bremen, Germany
Insights into chemolithoautotrophy at deep-sea hydrothermal vents from in-situ *experiments and metabolic modeling* July 8th, 2014

Conference Activity

Gordon Research Conference/Seminar in Marine Molecular Ecology (2017) Hong Kong S.A.R., China
Primary Productivity and Ecophysiology of Chemosynthetic Campylobacteria (Poster Presentation)

International Society for Microbial Ecology (2016) Montreal, QC, Canada
Primary Productivity and Ecology of the Subseafloor Biosphere at Deep-Sea Hydrothermal Vents, 9 °N East Pacific Rise (Oral Presentation)

Gordon Research Conference in Marine Molecular Ecology (2015) Hong Kong S.A.R., China
Bacterial Chemosynthesis at Deep-Sea Hydrothermal Vents Quantified by Cultivation at in-situ *Pressure and NanoSIMS Analysis* (Poster Presentation)

Gordon Research Seminar in Marine Molecular Ecology (2015) Hong Kong S.A.R., China
Incubations of Hydrothermal Vent Communities at In-situ Pressure and Temperature Quantify Community Primary Productivity of the Subseafloor Biosphere (Oral Presentation)

American Society for Microbiology General Meeting (2015) New Orleans, LA, USA
Simulated Seafloor Conditions Reveal Epsilonproteobacteria *as Dominant Chemoautotrophs in Fluids from the Subseafloor Biosphere at Deep-Sea Vents* (Young Investigator Oral Presentation)

American Society for Microbiology General Meeting (2014) Boston, MA, USA
A Genome-Scale Metabolic Model of Sulfurimonas denitrificans *Provides Insight into the Process of Autotrophic Denitrification* (Young Investigator Oral Presentation)

Departmental Seminars

Woods Hole Oceanographic Institution; Woods Hole, MA, USA
Productivity, Metabolism and Physiology of Free-Living Chemoautotrophic Epsilonproteobacteria (Thesis defense) Aug 1st, 2016

Woods Hole Oceanographic Institution; Woods Hole, MA, USA
Simulated Seafloor Conditions Reveal Epsilonproteobacteria *as Dominant Chemoautotrophs in Fluids from the Subseafloor Biosphere at Deep-Sea Vents* Feb 19th, 2015

Professional Service

Reviewer for: Scientific Reports, PLoS One, Frontiers in Microbiology, International Journal of Systematic and Evolutionary Microbiology

Professional Affiliations

American Association for the Advancement of Science (AAAS), American Society for Microbiology (ASM), Canadian Society for Microbiology (CSM)

Research Cruises

November 2014, East Pacific Rise 9°N, R/V *Atlantis*: AT26-23, Chemoautotrophic

Carbon Production at Deep-Sea Hydrothermal Vents
January 2014, East Pacific Rise 9°N, R/V *Atlantis*: AT26-10, Dimensions of Biodiversity, An Integrated Study of Energy Metabolism, Carbon Fixation, and Colonization Mechanisms in Chemosynthetic Microbial Communities at Deep-Sea Vents
July-Aug 2012, Rhode Island Continental Shelf, R/V Endeavor: Deep Ocean Benthic Sampler Cruise

Computational Experience

Scripting Languages: Python and Bash.

Bioinformatics Software Experience: qiime/qiime2, SPAdes/metaSPAdes, Redundans, ARB, BLAST, BWA-MEM, CheckM, EMIRGE, FIJI, graftM, Integrative Genomics Viewer, Jspecies, KaKs Calculator, komplexity, look@NanoSIMS, Prokka, RAxML, SAMtools, Snippy, TMHMM.

Languages

Written Chinese (functional with traditional and simplified characters), Mandarin Chinese (conversational), Cantonese (basic spoken), French (conversational), Spanish (functional)