



NADIA SZEINBAUM

MICROBIAL PHYSIOLOGIST

CONTACT

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PROFILE

I am a microbial physiologist with expertise in microbial central metabolism and anaerobic pathways for energy generation. I would like to be able to converge my scientific knowledge, leadership, and spirituality, to contribute knowledge, inspire other people to find their way.

EDUCATION

Ph.D. in Microbiology

School of Biology,
Georgia Institute of Technology
2014

M.Sc. in Environmental Engineering

Georgia Institute of Technology
2009

BS, Biology

Universidad de Belgrano,
Buenos Aires, Argentina
2005

ACADEMIC EXPERIENCE

NASA Postdoctoral Program Fellow

Earth and Atmospheric Sciences,
Georgia Institute of Technology
2018-Present

Using synthetic microbial communities as a tool to explore the role of microbial interactions to overcome ROS toxicity under reconstructed ancient (pre-GOE) conditions. Provided expertise in flow cytometry in collaborative project with other NPP fellow. Established a visiting collaboration with Dr. Patricia Sanchez-Baracaldo at the University of Bristol, UK. PI: Dr. Jennifer Glass

Postdoctoral Researcher

Earth and Atmospheric Sciences,
Georgia Institute of Technology
2015-2018

Studied the physiological and genetic basis of anaerobic methane and acetate oxidation coupled to extracellular metal reduction in model strains and in enrichment cultures from environmental samples using comparative genomics, physiological characterization, biochemical analyses of metabolites, and metaproteomics.
PI: Dr. Jennifer B. Glass

ACADEMIC EXPERIENCE

Teaching Faculty

Universidad de Belgrano
Buenos Aires, Argentina
2014-2015

Directed two Undergraduate Thesis Research Projects in solid-state fermentation for the production of Tempeh, a traditional soy-based product from Thailand, using Argentinian native beans *Phaseolus lunatus* and *P. vulgaris*.

Graduate Research Assistant

School of Biology
Georgia Institute of Technology
2010-2014

Enrichment of microbes mediating Mn(III) and ammonia transformations
Genetic mechanisms for manganese (IV) and (III) reduction by *Shewanella oneidensis*
Shewanella oneidensis mediating anaerobic Fe²⁺ oxidation coupled to NO₂⁻ reduction.
PI: Dr. Thomas J. DiChristina

Graduate Teaching Assistant

School of Biology
Georgia Institute of Technology
2009-2010

Graduate Research Assistant

Civil and Environmental Engineering
Georgia Institute of Technology
2007-2009

Evaluated the potential for biogas production using solid and liquid waste from a paper manufacturing wastewater treatment plant. PI: Dr. Spyros Pavlostathis.

Research Scientist

INGEBI
Buenos Aires, Argentina
2006-2007

Evaluated the flocculation dynamics of wastewater activated sludge.

Undergraduate Research

INGEBI
Buenos Aires, Argentina
2004-2005

Isolated a *Pseudomonas* sp. strain capable of using naphthalene as only source of carbon and energy and assessed its bioaugmentation potential for use in bioremediation.

TEACHING EXPERIENCE

Lab Instructor

Universidad de Belgrano
Buenos Aires, Argentina
2014-2015

Designed homework and lab projects for students in Chemistry and Pharmacology majors. Designed two Undergraduate Thesis Projects for Food Technology students.

Teaching Assistant

School of Biology
Georgia Institute of Technology
2009-2011

Led an introductory organismal biology laboratory course for two semesters including recitation, supervising students carrying out experimental protocols, administering quizzes and exams, and grading. Assisted a faculty member during recitation hours of an introductory course in microbiology and organized study groups for students.

Grader

Civil and Environmental Engineering
Georgia Institute of Technology
2009

Graded homework and exams for an introductory course in environmental microbiology taught by Dr. Jim Spain and Dr. Konstantinos Konstantinidis.

PUBLICATIONS

Hui L, N. Szeinbaum, TJ DiChristina, M Taillefert (2012) Microbial Mn(IV) reduction requires an initial one-electron reductive solubilization step.
Geochimica et Cosmochimica Acta **99**:179-192.

Szeinbaum N., JL Burns, TJ DiChristina (2014) Electron transport and protein secretion pathways involved in Mn(III) reduction by *Shewanella oneidensis*.
Environmental Microbiology Reports **6**(5): 490-500.

Gormally C, C. Subiño, N. Szeinbaum (2016) Uncovering barriers to enacting inquiry teaching: Inconsistent facilitation techniques, student resistance, and reluctance to share control over learning with students.
Journal of Microbiology & Biology Education **17**(2): 215–224.

Szeinbaum N., Lin, H., Brandes, J. A., Taillefert, M., Glass, J. B. and T. J. DiChristina (2017), Microbial manganese(III) reduction fuelled by anaerobic acetate oxidation.
Environ Microbiol, **19**: 3475–3486.

Szeinbaum N., C Kellum, JB Glass, JM Janda, TJ DiChristina (2018) Whole genome sequencing reveals that *Shewanella haliotis* Kim et al. 2007 is a later heterotypic synonym of *Shewanella algae* Simidu et al. 1990, 335 emend. Nozue et al. 1992 .
International Journal of Systematic and Evolutionary Microbiology.

Szeinbaum, N., D. Shin, Y. Toporek, TJ DiChristina (2018) "Application of *Shewanella* to Water Treatment Issues" Encyclopedia of Water: Science, Technology, and Society (in press)

Szeinbaum, N., DiChristina, TJ., Crowe, S., Nunn, B., and Jennifer Glass (2019) Expression of extracellular multiheme cytochromes discovered in betaproteobacteria during Mn(III) reduction (ISMEJ, under review)

Szeinbaum, N., P. Sanchez-Baracaldo, J. Glass. Catalase evolution in Prokaryotes (in preparation)

Szeinbaum, N., C. Reinhard, P. Sanchez-Baracaldo, J. Glass. The microbial ecology of the Great Oxidation Event (in preparation)

Speller N., Cato M., Szeinbaum N., McNeice JL., Meister. MR, Mullen AD., Dichek D., Schmidt B., A Stockton. A portable microfluidic cell counter for application on a submersible autonomous vehicle (In preparation).

OTHER PUBLICATIONS

Szeinbaum, N., Erijman, L. (2007) Identificación molecular de Pseudonocardia sp. como bacteria responsable de bulking filamentoso en una planta de tratamiento de efluentes industriales. **Ingeniería Sanitaria y Ambiental 95: 85-89.** ("Molecular identification of a Pseudonocardia sp. responsible for filamentous bulking in an industrial wastewater treatment plant")

Szeinbaum, N. and S. Pavlostathis (2009) Assessment of anaerobic treatment of select waste streams in paper manufacturing operations. **Master of Science Thesis.**

AWARDS&RECOGNITIONS

NASA Postdoctoral Program (NPP): NPP Fellowship 2018-2020 (Stipend and travel funds for a total value of \$150,000)

Office of Diversity and Inclusion + ADVANCE: **Georgia Tech Diversity and Inclusion Fellow 2019** (\$1,000)

American Society for Microbiology: **General Meeting Travel Award 2017** (\$500)

American Society for Microbiology: **General Meeting Travel Award 2012** (\$500)

SCIENTIFIC TALKS

Szeinbaum, N., Reinhard, CT., and Jennifer Glass (2019) "Building a Biogeochemical Model of the GOE" Deep Time II Workshop, MIT

Szeinbaum, N., Reinhard, CT., and Jennifer Glass (2019) "A Microbial consortium to explore cooperation on Early Earth" AbSciCon2019

Szeinbaum, N., Reinhard, CT., and Jennifer Glass (2019) "A Microbial consortium to explore cooperation on Early Earth" Astrobiology Colloquium, Georgia Tech

"Extremophiles in Astrobiology" (2018) Astrobiology Workshop, Astrobiology Society of Peru (Online)

"Metaproteomics Reveal Uncharacterized Electron Conduits in Betaproteobacteria" (2018) Goldschmidt Conference

SCIENTIFIC TALKS

"Metaproteomics Reveals a Novel Betaproteobacterium With Roles in Metal and Nitrogen Cycling in Lake Matano's Deep Subsurface" (2018) American Society for Microbiology General Meeting Rapid Fire Talk and Poster talk

"Metaproteomics Reveals a Novel Betaproteobacterium With Roles in Metal and Nitrogen Cycling in Lake Matano's Deep Subsurface" (2018) <https://www.youtube.com/watch?v=ohmtTWCD4mw>

"New Pathways for Old Metals" (2018) Dr. Kleiner's lab meeting at North Carolina State University

"Extremophiles in two dimensions" (2017) Astrobiology Workshop, Astrobiology Society of Peru (Online)

"Anaerobic Acetate Oxidation coupled to Mn(III) Reduction" (2016) Georgia Institute of Technology Biogeochemistry Seminar

CONFERENCE POSTER PRESENTATIONS

Szeinbaum, N., J Brandes, T DiChristina, F Stewart, S Crowe, and JB Glass (2017) Poster: "Mn(III) reduction fueled by acetate oxidation", ASM, New Orleans, LA.

Szeinbaum N, S Zhao, Y Tang, C. Henny, SA Crowe, FJ Stewart, TJ DiChristina, JB Glass (Poster). "Manganese biosignatures: Mn(III) mineral formation during Mn(IV) oxide reduction", at AbSciCon, Mesa, AZ.

Szeinbaum N, BC Reed, TJ DiChristina, FJ Stewart, JA Brandes, SA Crowe, JB Glass (2017) Poster. "Do mineralogy and methane matter for microbial manganese mobilization?", at Southeast Biogeochemistry Symposium, Athens, GA.

Szeinbaum, N., J Brandes, T DiChristina, F Stewart, S Crowe, and JB Glass (2016) Poster: "Do mineralogy and methane matter for manganese mobilization", at Gordon Research Conference in Waterville Valley, NH.

Szeinbaum, N., J Brandes, T DiChristina, F Stewart, S Crowe, and JB Glass (2016) Poster: "Do mineralogy and methane matter for manganese mobilization", at Abgradcon in Boulder, CO.

Szeinbaum, N., Brandes, J Thomas DiChristina, Frank Stewart, Sean Crowe, and Jennifer Glass (2016) Poster: "Do mineralogy and methane matter for manganese mobilization", at the Southeastern Biogeochemistry Symposium in Knoxville.

CONFERENCE POSTER PRESENTATIONS

Szeinbaum, N., and TJ DiChristina (2016) Poster: "Newly isolated member of the genus *Shewanella* couples anaerobic acetate oxidation to metal reduction" at 116th ASM general meeting in Boston, MA

Szeinbaum, N., M. Taillefert and TJ DiChristina (2012) Poster: "*Shewanella oneidensis* respiratory mutants selected for their inability to reduce soluble Mn(III) retain the ability to reduce soluble (but not solid) forms of Fe(III)" at 112th ASM general meeting in San Francisco, CA

Szeinbaum, N., Hui, L., Taillefert, M., and T DiChristina (2010) Poster: "Mn(III) Respiration-deficient mutants of *Shewanella oneidensis* MR-1 accumulate Mn(III) during Anaerobic Mn(IV) respiration", at 110th ASM general meeting in San Diego, CA

SCIENCE COMMUNICATION AND OUTREACH

Leadership roles

Outreach Chair for AbGradCon 2018 (~200 attendees to outreach event)
MC and participant in Alive in Sci-Fi panel for DragonCon 2019 in Atlanta, GA (~50 attendees)

Co-Editor of the Astrobiology Primer V3.0 (in preparation)

Published written material (selected):

"Bacteria Get By With A Little Help From Their Friends" Sciworthy (<http://sciworthy.com/bacteria-get-by-with-a-little-help-from-their-friends/>)

"Caves host gooey biofilms built by methane-eating bacteria" (<https://sciworthy.com/caves-host-gooey-biofilms-built-by-methane-eating-bacteria/>)

Public talks and panels:

"The hidden lives of microbes in the wild and how they transform our planet" Tucker Middle School (2018) (~100 students)

Evolution Animated – Panel at Monday Night Garage Brewery organized by ASF (2018) (~40 attendees)

"Invisible giants: the global power of microorganisms" (2017) Public Talk at Atlanta Science Tavern Science and Science Fiction Panel at the Atlanta Science Festival 2019

ACADEMIC PROFESSIONAL DEVELOPMENT AND LEADERSHIP

Chair AbSciCon 2019 Session: Astroecology

Core organizer AbGradCon 2018

Outreach Chair for AbGradCon 2018 (~200 attendees to outreach event)

Organization of session "Redox processes in Astrobiology-From Nebulae to Life"
Abscon. April 2017

Future Faculty workshop. Georgia Institute of Technology. June 2015

ASEE 5th Annual INSPIRE2 Workshop (American Society for Engineering Education)
Georgia Institute of Technology. March 2017

SERVICE

Diversity and Inclusion – A family-friendly campus

Organized a family story time pilot program at the GeorgiaTech library to promote inclusion of families on campus (2019).

Surveyed students with families or partners to assess the perception of students with families on campus inclusivity (2019)

Advised and assisted with the incorporation of spouses and families into a family-oriented student club (2019).

Student wellbeing and mental health

Facilitate leadership, self-development and resilience workshops (2012-present)

Advisor for the SKY Student club at GT (2018-present)