

BIOGRAPHICAL SKETCH

Theodore M. Flynn

Education

University of Illinois Urbana, Ill.
Ph.D. in Geology, 2011

University of Notre Dame Notre Dame, Ind.
B.S. in Environmental Geoscience, 2004

Research Experience

Postdoctoral Fellow, Argonne National Laboratory
Kenneth M. Kemner, supervisor.

- Conduct molecular-scale investigations of the biogeochemical processes that control the mobility of contaminant metals such as uranium
- Integrate geochemical modeling combined with laboratory incubations of anaerobic bacteria to greater understand the nature of microbial activity in the subsurface.
- Collaborate with synchrotron x-ray physicists to integrate nanoscale measurements of contaminant chemistry with molecular analyses of the composition of complex microbial communities

Student Research Contractor, United States Environmental Protection Agency
Jorge W. Santo Domingo, supervisor.

- Collaborated closely with senior scientists at E.P.A. on the design and execution of a project characterizing the impact of increased atmospheric CO₂ concentrations on microbially-catalyzed metal release in drinking water aquifers.
- Extracted nucleic acids (DNA/RNA) from groundwater and sediment for characterization using molecular techniques such as PCR, gel electrophoresis, cloning, and sequencing.
- Characterized the composition of microbial communities from 16S rRNA gene and PhyloChip datasets using mothur, QIIME, and ARB.

Graduate Research Assistant, University of Illinois at Urbana-Champaign
Craig M. Bethke and Robert A. Sanford, advisors.

- Designed, constructed and implemented flow-through sediment column experiments testing the effect of groundwater chemistry on aquifer microbial communities.
- Analyzed the chemical composition of groundwater using ion, high-pressure and gas chromatography and other wet chemical analyses.

- Profiled aquifer microbial communities using terminal restriction fragment length polymorphism (T-RFLP), 16S rRNA gene clone libraries, and other molecular tools.
- Quantified differences in microbial community structure using multivariate statistics.

Undergraduate Research, University of Notre Dame
Peter C. Burns, advisor.

- Synthesized novel uranyl phosphate and arsenate minerals for structural analysis by single crystal x-ray diffractometry.

Professional Affiliations

- American Society for Microbiology
- American Geophysical Union
- Geochemical Society
- Geological Society of America
- International Society for Microbial Ecology

Honors & Awards

- Director's Postdoctoral Fellowship. Argonne National Laboratory. 2011-2013
- Isotech Research Review Poster Award, School of Earth, Society and the Environment, University of Illinois at Urbana-Champaign, 2005, 2009
- Marsha Ring Winslow Research Grant, University of Illinois Department of Geology, 2009
- Daniel S. and Edith T. Grosch Scholarship. Marine Biological Laboratory, 2008
- Frank R. Lillie Scholarship. Marine Biological Laboratory, 2008
- Roscoe Jackson Graduate Research Grant. Department of Geology, University of Illinois at Urbana-Champaign. 2008
- Phi Kappa Phi honor society. University of Illinois at Urbana-Champaign, elected 2008
- Grad College Conference Travel Award. University of Illinois at Urbana-Champaign. 2007, 2008
- Texas-Louisiana Alumni Fellowship. Department of Geology, University of Illinois at Urbana-Champaign. 2004-2005
- Gutschick Award for Excellence in Undergraduate Research. University of Notre Dame. 2004
- National Science Foundation REU Summer Fellowship. 2003

PUBLICATIONS

Flynn T. M., R. A. Sanford, J. W. Santo Domingo, N. J. Ashbolt, A. D. Levine, C. M. Bethke (2012) The active bacterial community in a pristine, confined aquifer. *Water Resources Research*. 48(9):W09510.

Bethke, C. M., R. A. Sanford, M. F. Kirk, Q. Jin, **T. M. Flynn**. (2011). The thermodynamic ladder in geomicrobiology. *American Journal of Science*. 311:183-

210.

Sanford, R. A., **T. M. Flynn**, T. R. Holm, W. R. Kelly. (2009). Fate of arsenic in the Mahomet Aquifer: The influence of added sulfate and nitrate. *Midwest Technology Assistance Center Publication*. TR08-06.

Flynn, T. M., R. A. Sanford, C. M. Bethke. (2008). Attached and suspended microbial communities in a pristine confined aquifer. *Water Resources Research*. 44(7):W07425.

Locock, A. J., P. C. Burns, **T. M. Flynn**. (2005). The role of water in the structures of synthetic hallimondite, $Pb_2[(UO_2)(AsO_4)_2](H_2O)_n$ and synthetic parsonsite, $Pb_2[(UO_2)(PO_4)_2](H_2O)_n$, $0 \leq n \leq 0.5$. *American Mineralogist*. 90(1):240-246.

Locock, A. J., P. C. Burns, **T. M. Flynn**. (2005). Structures of strontium- and barium-dominant compounds that contain the autunite-type sheet. *Canadian Mineralogist*. 43:721-733.

Locock, A. J., P. C. Burns, M. J. M. Duke, **T. M. Flynn**. (2004). Monovalent cations in structures of the meta-autunite group. *Canadian Mineralogist*. 42:973-996.

PRESENTATIONS

General Symposia and Conference Presentations

Flynn, T. M. *Microbial diversity in a geochemically-zoned, pristine aquifer*. 5th Annual Postdoctoral Research Symposium, Argonne National Laboratory, Argonne, Illinois, 2012.

Flynn, T. M., R. A. Sanford, J. W. Santo Domingo, B. Iker, N. J. Ashbolt, A. D. Levine, C. M. Bethke. *Resilience of bacterial communities in a pristine aquifer despite changes in the availability of sulfate*. Geochemical Society, 22nd Goldschmidt Geochemistry Conference, Montréal, QC, Canada, 2012.

Dong, Y., I. K. O. Cann, R. M. Mackie, N. D. Price, **T. M. Flynn**, R. A. Sanford, P. A. Miller, N. L. P. Chia, C. G. Kumar, P. J. Kim, M. Sivaguru, B. W. Fouke. (2010). *Looking for a needle in the haystack: Deciphering indigenous 1.79 km deep subsurface microbial communities from drilling mud contaminants using 454 pyrotag sequencing*. American Geophysical Union, Fall Meeting, San Francisco, California, 2010.

Flynn, T. M., R. A. Sanford, C. M. Bethke, J. W. Santo Domingo, B. Iker, N. J. Ashbolt, A. D. Levine. *Variations in the active bacterial community in a pristine confined aquifer*. International Society for Microbial Ecology, 13th International Symposium on Microbial Ecology, Seattle, Washington, 2010

Strattan, D. J., R. A. Sanford, **T. M. Flynn**, C. M. Bethke. (2010). *Gene expression of dissimilatory sulfite reductase in *Desulfovibrio vulgaris* as a marker for the rate of sulfate reduction in natural systems*. Geochemical Society, Goldschmidt Conference on Earth, Energy, and the Environment, Knoxville, Tennessee, 2010.

Flynn, T. M., R. A. Sanford, C. M. Bethke. *Groundwater chemistry and the active bacterial community in a pristine confined aquifer*. Geochemical Society, Goldschmidt Conference on Earth, Energy, and the Environment, Knoxville, Tennessee, 2010.

Bethke, C. M., R. A. Sanford, **T. M. Flynn**, M. F. Kirk. (2009). *The thermodynamic ladder in aquifer microbiology*. Geological Society of America, 119th Annual Meeting, Portland, Oregon, 2009.

Strattan, D. J., M. P. Kyrias, R. A. Sanford, **T. M. Flynn**, C. M. Bethke. (2008). *In situ sampling method for determining dissolved gas content and major ion composition of groundwater*. Geological Society of America, 118th Annual Meeting, Houston, Texas, 2008.

Flynn, T. M., R. A. Sanford, C. M. Bethke. *Microbial communities and groundwater chemistry in a pristine confined aquifer*. Geological Society of America, 118th Annual Meeting, Houston, Texas, 2008.

Bethke C. M., R. A. Sanford, **T. M. Flynn**, D. Ding, M. F. Kirk, J. Park, Q. Jin. *Reactive Transport Analysis of the Origin of Microbiological and Geochemical Zoning*. United States Department of Energy, 13th Computational and Numerical Geosciences Symposium, Gaithersburg, MD, 2007.

Flynn, T. M., R. A. Sanford, P. L. Wallace, C. M. Bethke. *Comparing the microbial communities obtained by various groundwater sampling techniques*. American Society for Microbiology, 107th Annual Meeting, Toronto, Ontario, 2007.

Flynn, T. M., R. A. Sanford, P. L. Wallace, C. M. Bethke. *Groundwater filtrates as samples of the subsurface microbial community*. Geological Society of America, 116th Annual Meeting, Philadelphia, Pennsylvania, 2006.

Invited Presentations

Flynn, T. M. *The ecology of iron-reducing and sulfate-reducing bacteria in a pristine, confined aquifer*. Biosciences Division Seminar, Argonne National Laboratory, 2010.

Flynn, T. M. *The active bacterial community in a pristine, confined aquifer* Challenges in Environmental Molecular Microbiology Workshop, Argonne National Laboratory, 2010.