

Curriculum Vitae

Anthony Garza

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RESEARCH INTERESTS

The research in my laboratory focuses on two broad topics. First, we study the transcriptional regulation and function of genes associated with formation of bacterial biofilms, which are surface-associated communities of bacterial cells that have been implicated in persistent human infections, water contamination and the obstruction of industrial machinery. Second, we study the regulation of genes for bacterial natural products, which have been a major source of therapeutic agents such as antibiotics, anti-fungal drugs and anti-cancer drugs. In addition, we seek to use our knowledge of natural product gene regulation to build platforms for the identification and production of new natural products with therapeutic value. For both of these projects, we use a combination of genetic, molecular biological, biochemical and bioinformatics approaches.

PROFESSIONAL EXPERIENCE

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| 2013 (Nov)-present | Program Director in the Division of Molecular Biosciences at the National Science Foundation. |
| 2009-present | Associate Professor in the Department of Biology at Syracuse University. Primary Research Projects: Gene regulation during bacterial biofilm development and bacterial-derived natural products. |
| 2004-2009 | Assistant Professor in the Department of Biology at Syracuse University. Primary Research Projects: Gene regulation during bacterial biofilm development and bacterial-derived natural products. |
| 2001-2004 | Assistant Professor in the School of Molecular Biosciences at Washington State University. Primary Research Projects: Gene regulation and cellular differentiation during bacterial biofilm development. |

- 1998-2000 Stanford University, Postdoctoral Research for Dr. Dale Kaiser. Topic: Spatial control of biofilm-associated genes.
- 1996-1998 University of California, Davis, Postdoctoral Research for Dr. Mitchell Singer. Topic: Early biofilm development.
- 1989-1995 Texas A&M University, Graduate Student. Dissertation research for Dr. Michael Manson. Topic: *E. coli* motility (Ph.D. Microbiology, 1995).

EDUCATION

- 1995 Texas A&M University, Ph.D. in Microbiology.
- 1987 Southwest Texas State University, B.S. in Biology.

HONORS AND MEMBERSHIPS

- 1999-present Member American Society for Microbiology.
- 1997 Awarded a Postdoctoral Fellowship from NIH (2 years).
- 1996 Awarded a Ford Foundation Postdoctoral Fellowship (1 year).

TEACHING EXPERIENCE

- 2005-present Instructor for undergraduate course in Environmental Microbiology at Syracuse University.
- 2007-present Instructor for undergraduate course in General Microbiology at Syracuse University.
- 2013 Instructor for First Year Forum.
- 2012-2013 Instructor for undergraduate course in Infectious Diseases (MayMester).
- 2010-2012 Co-organizer of the Graduate Research Seminar.
- 2009-2010 Organizer of the Departmental Seminar Series in Biology.
- 2005-2006 Instructor for graduate and undergraduate courses in Signal Transduction Systems at Syracuse University.
- 2003 Instructor for graduate course in Molecular Biology at Washington State University.

2002 Instructor for graduate course in Signal Transduction at Washington State University.

2001-2004 Instructor for undergraduate Microbiology course at Washington State University.

1996-1997 Instructor for the Howard Hughes program for minority biology majors at University of California, Davis.

1989-1994 Graduate Teaching Assistant for Microbiology laboratory courses at Texas A&M University.

RESEARCH SUPPORT

6/1/14-5/31/17-National Science Foundation Grant IOS-1354779 (\$319, 509):
“Coordinating Developmental Gene Expression in *Myxococcus xanthus*” (Garza PI).

COMPLETED RESEARCH SUPPORT

8/10 to 7/14-National Science Foundation Grant IOS-0950976 (\$410, 000):
“Coordinating Developmental Gene Expression in *Myxococcus xanthus*” (Garza PI).

8/07 to 7/10-National Science Foundation Grant MCB 0717653 (\$395,000):
“Regulating Developmental Gene Expression in *Myxococcus xanthus*” (Garza PI).

7/06-6/07- National Science Foundation Grant MCB 0615806 (\$130,000)
“Regulating Developmental Gene Expression in *Myxococcus xanthus*” (Garza PI).

9/03-8/07-National Science Foundation Grant MCB 0316874 (\$380,000)
“Molecular Mechanisms of Sporulation in *Myxococcus xanthus*” (Garza Co-PI).

8/02-9/06- National Science Foundation Grants MCB 0212052 and MCB 0444154 (\$400,000)
“Coordinating Developmental Gene Expression in *Myxococcus xanthus*” (Garza PI).

6/01-5/02- Washington State University Pilot Grant (\$4,000)
“Spatial Control of Cellular Differentiation in *Myxococcus xanthus*” (Garza PI).

PUBLICATIONS

Li, T. Snyder, D. Shin, E. M. Amissah, P. & **Garza, A. G.** (in preparation). Nla4 directly regulates the (p)ppGpp synthetase gene *relA* and the onset of *Myxococcus xanthus* development.

Sarwar, Z. & **Garza, A. G.** (submitted to *J. Bacteriol.*). Two component signal transduction systems that regulate the temporal and spatial expression of *Myxococcus xanthus* sporulation genes.

- Giglio, K. M. Zhu, C. Klunder, C. Kummer, S. & **Garza, A. G.** (2015). The Enhancer Binding Protein Nla6 Regulates Developmental Genes that are Important for *Myxococcus xanthus* Sporulation. *J. Bacteriol.* **197**:1276-87.
- Rajagopalan, R. Sarwar, Z. **Garza, A. G.** & Kroos, L. (2014). Developmental Gene Regulation. In Z. Yang & P. Higgs (eds). *Myxobacteria: Genomics, Cellular and Molecular Biology*. Caister Academic Press.
- Stevens, D. C. Conway, K. Neslon, P. **Garza, A. G.** & Boddy, C. N. (2013). Alternative Sigma Factor Over-Expression Enables Heterologous Expression of a Type II Polyketide Biosynthetic Pathway in *Escherichia coli*. *PLoS One* **8**:e64858.
- Yan, J. Bradley, M. D. **Garza, A.** & Welch, R. (2012). A Clp/Hsp 100 chaperone functions in *Myxococcus xanthus* sporulation and self-organization. *J. Bacteriol.* **194**:1689-1896.
- Sarwar, Z. & **Garza, A. G.** (2012). The Nla28/Nla28S Two Component Signal Transduction System Regulates Sporulation in *Myxococcus xanthus*. *J. Bacteriol.* **194**:4698-4708.
- Sarwar, Z. & **Garza, A. G.** (2012). The Nla6S Protein of *Myxococcus xanthus* is the Prototype for a New Family of Bacterial Histidine Kinases. *FEMS Microbiol. Lett.* **335**:86-94.
- Giglio, K. M. & **Garza, A. G.** (2012). Sporulation in *Myxococcus xanthus*. P. 19-38. In E. Abel-Santos (ed). *Bacterial Spores: Current Research and Applications*. Caister Academic Press, UK.
- Giglio, K. M. Caberoy, N. B. Li, T. Suen, G. Kaiser, D. & **Garza, A. G.** (2011). A Cascade of Co-Regulating Enhancer Binding Proteins Initiates and Propagates a Multicellular Developmental Program. *Proc. Natl. Acad. Sci. USA.* **108**:E431-439.
- Giglio, K. M. Eisenstatt, J. & **Garza, A. G.** (2010). Identification of Enhancer Binding Proteins Important for *Myxococcus xanthus* Development. *J. Bacteriol.* **192**:360-364.
- Murphy, K. A. & **Garza, A. G.** (2008). Genetic tools for studying *Myxococcus xanthus* biology. P. 491-501. In D. E. Whitworth (ed). *Myxobacteria Multicellularity and Differentiation*. ASM Press, Washington DC.
- Ossa, F. Diodati, M. E. Caberoy, N. B. Giglio, K. M. Edmonds, M. Singer, M. & **Garza, A. G.** (2007). The *Myxococcus xanthus* Nla4 protein is important for expression of stringent response-associated genes, ppGpp accumulation, and fruiting body development. *J. Bacteriol* **189**: 8474-8483.
- Viswanathan, P. Murphy, K. A. Julien, B. **Garza, A. G.** & Kroos, L. (2007). Regulation of *dev*, an operon that includes genes essential for *Myxococcus xanthus* development and CRISPR-associated genes and repeats. *J. Bacteriol* **189**: 3738-3750.

- Dahl, J. L. Tengra, F. K. Yan, J. Dutton, D. Coyne, L. & **Garza, A. G.** (2007). Identification of proteins important for *Myxococcus xanthus* sporulation using a proteomic approach. *J. Bacteriol* **189**: 3187-3197.
- Tengra, F. K. Dahl, J. L. Dutton, D. Caberoy, N. B. Coyne, L. & **Garza, A. G.** (2006). CbgA, a protein involved in cortex formation and stress resistance in *Myxococcus xanthus* spores. *J. Bacteriol* **188**: 8299-8302.
- Suen, G. Jakobsen, J.S. Goldman, B.S. Singer, M. **Garza, A. G.** & Welch, R.D. (2006). Bacterial post-genomics: the promise and peril of systems biology. *J. Bacteriol.* **188**:7999-8004.
- Diodati, M. Ossa, F. Caberoy, N. B. Singer, M. & **Garza, A. G.** (2006). Nla18, a key regulatory protein required for normal growth and development of *Myxococcus xanthus*. *J. Bacteriol.* **188**: 1733-1743.
- Srinivasan, B. S. Caberoy, N. B. Suen, G. Taylor, R. G. Shah, R. Tengra, F. Goldman, B. S. **Garza, A. G.** & Welch, R. D. (2005). Functional genome annotation through phylogenomic mapping. *Nature Biotechnology.* **23**: 691-698.
- Lancero, H. L. Castaneda, S. Caberoy, N. B. Xiaoyuan M. **Garza, A. G.** & Shi, W. (2005). Analyzing protein-protein interactions of the *Myxococcus xanthus* Dif signaling pathway using the yeast two-hybrid system. *Microbiology* **151**: 1535-1541.
- Dahl, J. L. Arora, K. Boshoff, H. I. Whiteford, D. C. Pacheco, S. A. Walsh, O. J. Davis, W. B. & **Garza, A. G.** (2005). Analysis of the stringent response of *Mycobacterium smegmatis*. *J. Bacteriol.* **187**: 2439-2447.
- Lancero, H. L. Caberoy, N. B. Castaneda, S. Li, Y. Lu, A. Dutton, D. Duan, X. Kaplan, H. B. Shi, W. & **Garza, A. G.** (2004). Characterization of a *Myxococcus xanthus* mutant that is defective for adventurous and social motilities. *Microbiology* **150**: 4085-4093.
- Brenner, P. **Garza, A. G.** & Singer, M. (2004). *nsd*, a locus that affects the *Myxococcus xanthus* cellular response to nutrient concentration *J. Bacteriol.* **186**: 3461-3471.
- Caberoy, N. B. Welch, R. D. Jakobsen, J. S. Slater, S. C. & **Garza, A. G.** (2003). Global mutational analysis of NtrC-like activators in *Myxococcus xanthus*: identifying activator mutants defective for motility and fruiting body development *J. Bacteriol.* **185**: 6083-6094.
- Julien, B. J. Kaiser, D. & **Garza, A. G.** (2000). Spatial control of cell differentiation in *Myxococcus xanthus*. *Proc. Natl. Acad. Sci. U.S.A.* **97**: 9098-9103.
- Garza, A. G.** Harris, B. Z. Pollack, J. S. & Singer, M. H. (2000). The *asgE* locus is required for cell-cell signaling during *Myxococcus xanthus* development. *Mol. Microbiol.* **35**: 812-824.
- Garza, A. G.** Harris, B. Z. Greenberg, B. M. & Singer, M. H. (2000). Control of *asgE* expression during growth and development in *Myxococcus xanthus*. *J. Bacteriol.* **182**: 6622-6629.

Garza, A. G. Pollack, J. S. Harris, B. Z. Lee, A. Keseler, I. M. Licking, E. F. & Singer, M. H. (1998). SdeK is required for early fruiting body development in *Myxococcus xanthus*. *J. Bacteriol.* **180**: 4628-4637.

Garza, A. G. Biran, R. Wohlschlegel, J. A. & Manson, M. D. (1996). Mutations in *motB* suppressible by changes in stator or rotor components of the bacterial flagellar motor. *J. Mol. Biol.* **258**: 270-285.

Garza, A. G. Bronstein, P. A. Valdez, P. A. Harris-Haller, L. W. & Manson, M. D. (1996). Extragenic suppression of *motA* missense mutations of *Escherichia coli*. *J. Bacteriol.* **178**, 6116-6122.

Garza, A. G. Harris-Haller, L. W. Stoeber, R. A. & Manson, M. D. (1995). Motility protein interactions in the bacterial flagellar motor *Proc. Natl. Acad. Sci. U.S.A.* **92**: 1970-1974.

PRESENTATIONS

- 2015 SUNY Fredonia. “NSF Applications: A Program Director’s Perspective.”
- 2014 Syracuse University. “NSF Applications: A Program Director’s Perspective.”
- 2014 NSF Grants Conference in Arlington, Virginia. “NSF/BIO Research Support.”
- 2013 National Science Foundation. “Unraveling the Gene Networks that Regulate the Onset of Bacterial Biofilm Development.”
- 2011 38th International Conference on the Biology of Myxobacteria, Mount Kisco, NY. “The Nla4 Enhancer Binding Protein Regulates Entry into Development in *Myxococcus xanthus*.”
- 2009 University of Ottawa. Ottawa, Canada. “A Highly Conserved Expression System that Can Be Used for the Identification of New Therapeutic Agents.”
- 2008 Binghamton University. “Transcriptional Control of Bacterial Multicellularity.”
- 2007 34th International Conference on the Biology of Myxobacteria, Grenada, Spain. “A Transcriptional Cascade of Enhancer Binding Proteins Controls *M. xanthus* development.”
- 2006 SUNY Upstate Medical University. “Genome-Wide Approaches

- to Identifying Genetic Networks Required for Biofilm Formation.”
- 2005 Conference on Prokaryotic Development (American Society for Microbiology), Vancouver, Canada. “Coordinating Developmental Gene Expression in *Myxococcus xanthus*.”
- 2004 Pennsylvania State University. “Building a Multicellular Fruiting Body: Gene Expression and Cell Differentiation in *Myxococcus xanthus*.”
- 2004 Syracuse University. “Building a Multicellular Fruiting Body: Gene Expression and Cell Differentiation in *Myxococcus xanthus*.”
- 2004 Michigan State University. “NtrC-Like Activators and Coordinated Changes in Gene Expression During *Myxococcus xanthus* Development.”
- 2003 University at Albany. “Gene Expression and Cellular Morphogenesis in *M. xanthus*.”
- 2002 University of Idaho. “Coordinating Developmental Gene Expression in *M. xanthus*.”
- 2001 BLAST Conference, Cuernavaca Mexico. “Spatial Control of Cellular Differentiation in *M. xanthus*.”

PROFESIONAL SERVICE

- 2002-present Served as reviewer for the following journals: Archives of Microbiology, Journal of Bacteriology, Microbiology, Molecular Microbiology, Trends in Microbiology and PLoS Genetics, PLoS ONE and Nature Scientific Reports.
- 2008-present Member of Microbiological Safety Committee at Syracuse University.
- 2013-present Served as a program director in the Division of Molecular and Cellular Biosciences at the National Science Foundation
- 2014-present Editorial board member for the journal Nature-Scientific Reports
- 2002-2013 Served as an ad-hoc grant reviewer for NSF and USDA.
- 2013-2014 Co-chair of the Department of Biology Promotion and Tenure Committee.
- 2013 Served on the Postdoctoral Fellowship Review Panel for the Ford Foundation.

2012-2013	Chair of College of Arts and Sciences Promotion and Tenure Committee at Syracuse University.
2010-2012	Member of College of Arts and Sciences Promotion and Tenure Committee at Syracuse University.
2009-2010	Member of the Ad Hoc Task Force to Review Undergraduate Advising in Biology.
2005-2012	Served on 5 faculty search committees for the Department of Biology at Syracuse University.
2004-2012	Served on the NSF Prokaryotic Molecular and Cellular Biology grant panel 3 times (2004, 2005, 2007), the Plant and Microbial Development Panel 1 time (2010) and Prokaryotic Biology Panel 1 time (2012).
2001-2004	Served on the Graduate Recruiting Committee for the School of Molecular Biosciences at Washington State University.

GRADUATE STUDENT TRAINING

Nora Caberoy	Ph.D. in Genetics and Cell Biology 12/05 from Washington State University. Current position: Assistant Professor at University of Nevada, Las Vegas.
Faisury Ossa	Ph.D. in Biology 12/06 from Syracuse University (Fulbright scholar). Current position: research scientist at Lallemand Ruminant Research Center.
Farah Tengra	Ph.D. in Biology 12/09 from Syracuse University. Current position: Instructor at Onondaga Community College.
Ting Li	Ph.D. in Biology 8/10 from Syracuse University. Current position: research scientist at Oak Ridge National Laboratory in Oak Ridge, TN.
Krista Giglio	Ph.D. in Biology 12/11 from Syracuse University. Current position: postdoctoral researcher at Cornell University.
Jinyuan Yan	Ph.D. in Biology 8/12 from Syracuse University (Co- advised with Roy Welch). Current position: postdoctoral researcher at Memorial Sloan-Kettering Cancer Center.
Zaara Sarwar	Ph.D. in Biology 8/12 from Syracuse University. Current position: postdoctoral researcher at New York University.

David Lemon 3rd year Ph.D. student in the Biology Department at Syracuse University (IGERT fellow).

Sonia Johns 1st year Ph.D. student in the Biology Department at Syracuse University

UNDERGRADUATE STUDENT RESEARCH TRAINING

Shannon Baron 6 months, Biology Student at Syracuse University.

Soleil Young 2 years, Biology Student at Syracuse University.

Megan Baron 2 years, B.S. (Biology) from Syracuse University 5/15.

Paul Amissah 1 year, B.S. (Biology) from Syracuse University 5/14.

Nate Simon 1 year, B.S. (Biology) from Syracuse University 5/13.

Mari Couason 2 years, B.S. (Biology) from Syracuse University 5/12.

Ellen Shin 1.5 years, B.S. (Biology) from Syracuse University 12/11.

Jonathan Kim 1 year, B.S. (Biology) from Syracuse University 12/11.

Shane Diamond 1 year, B.S. (Biology) from Syracuse University 5/09.

Francine Palmares 1 year, B.S. (Biology) from Syracuse University 5/09.

Natasha Hodgson 1 year, B.S. (Biology) from Syracuse University 5/09.

Amy Park 1 year, B.S. (Biology) from Syracuse University 5/08.

Sijung Suh 1 year, B.S. (Biology) from Syracuse University 5/07.

William Murtaugh 1 year, B.S. (Biology) from Syracuse University 5/07.

Jessica Eisenstatt 1.5 years, B.S. (Biology) from Syracuse University 5/07.

Ryan O'Connell 1 semester, B.S. (Biology) from Syracuse University 5/06.

Mick Edmonds 1 year, B.S. (Microbiology) from Washington State University.