CURRICULUM VITAE MICHAEL J. GRAY

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EDUCATION

Ph.D. in Microbiology, University of Wisconsin – Madison, Madison, WI, 2010.

Thesis – Synthesis, remodeling, and salvaging of the lower ligand of coenzyme B_{12}.

M.S. in Food Science, University of California – Davis, Davis, CA, 2001.

Thesis - The NarX histidine kinase of *Escherichia coli*; the central domain and ligand-responsive autophosphorylation.

B.S. in Food Science, Cornell University, Ithaca, NY, 1999.

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Microbiology, University of Alabama at Birmingham (Jan. 2016 – present) Directed laboratory researching the molecular biology of bacterial stress response, in particular focused on how members of the gut microbiota respond to reactive chlorine species.

Research Laboratory Specialist Intermediate, Molecular, Cellular, and Developmental Biology, University of Michigan (Jan. 2015 – Dec. 2015) Conducted research on bacterial responses to oxidative stress, using biochemical, genetic, transcriptomic, physiological, and biophysical methods. Also supervised undergraduate researchers and assisted with grant and manuscript preparation.

Postdoctoral Research Fellow, Molecular, Cellular, and Developmental Biology, University of Michigan (June, 2010 – Jan. 2015) Conducted research on bacterial responses to proteotoxic reactive chlorine stress, using biochemical, genetic, transcriptomic, physiological, and biophysical methods. Also supervised undergraduate researchers and assisted with grant preparation.

Lab Technician III, Cornell University Food Safety Laboratory (Jan. 2002 – July 2004) Conducted research on food-borne pathogens *Listeria monocytogenes* and *Vibrio parahaemolyticus*. Experiments involved use of mammalian tissue culture techniques and the construction and use of promoter fusion constructs. Also assisted in general lab maintenance and support of other researchers.

Research Assistant, Cornell University Food Safety Laboratory (June 1997 – Aug. 1999) Assisted with research on food spoilage bacteria and pathogens including *L. monocytogenes* and *V. parahaemolyticus*. Experiments involved both phenotypic and molecular techniques.

HONORS AND AWARDS

Ruth L. Kirschstein National Research Service Award for Individual Postdoctoral Fellowship (F32 GM096613-01), 2011-2013 - The NRSA is an NIH fellowship that provides up to three years of support for promising postdoctoral scholars who have the potential to become productive, independent investigators within the broad scope of biomedical, behavioral, or clinical research.

Molecular Mechanisms of Microbial Pathogenesis Training Grant (T32 AI07528-12), 2010 - The MMMP is an NIH funded training grant which provides an array of opportunities for both graduate and postdoctoral training to supplement the individual research program and to provide a broader appreciation for microbial pathogenesis and infectious diseases.

Herman A. Smythe Award, 2009 - This award recognizes research excellence by a doctoral student in the UW-Madison Bacteriology department, which I received in recognition of my doctoral research on the bacterial biosynthesis of vitamin B_{12}.

Louis and Elsa Thomsen Wisconsin Distinguished Graduate Fellowship, 2008-2009 - This award is designated to support graduate students in the College of Agricultural and Life Sciences at the University of Wisconsin - Madison who have established an outstanding research record.

Jerome J Stefaniak Predoctoral Fellowship, 2008 - This award recognizes research excellence by a doctoral student in the UW-Madison Bacteriology department.

Herman H. and Gwendolyn H. Shapiro Medical Scholarship, 2004-2005 - This award is given to exceptional second-year students in biomedical sciences at UW-Madison.

Wine Spectator California Fellowship, Winter 2000 - This fellowship is awarded to outstanding graduate students in viticulture and enology, reflecting my studies in the Food Science department at the UC-Davis.

National Dairy Promotion Board Scholarship, Spring 1998 - This undergraduate scholarship is awarded based on academic achievement, an interest in a career in a dairy-related discipline, plus demonstrated leadership, initiative and integrity. I received this award while studying Food Science at Cornell University.

Institute of Food Technologists Junior/Senior Scholarship, Fall 1997 - Awarded in recognition of outstanding academic achievement in food-related studies.

Charles H. Roberts Scholarship, Cornell University, Fall 1997 - Awarded in recognition of academic achievement by an undergraduate student.

General Mills Food Science Award, Spring 1997 - Award for incoming freshman or existing undergraduates with a 3.00 GPA in Food Science.

PUBLICATIONS

• *h*-index = 13; citation numbers from Google Scholar, accessed July 23, 2015

* indicates co-first author publications

1. Dahl, J.-U.*, **Gray, M.J.***, and Jakob, U. Mesalamine inhibits bacterial polyphosphate accumulation. *In preparation*

2. **Gray, M.J.***, Li, Y.*, Leichert, L.I.O., Xu, Z., and Jakob, U. Does the transcription factor NemR use a regulatory sulfenamide bond to sense bleach? **Antioxid Redox Signal** 2015; 23(9): 747-754.

3. **Gray, M.J.** and Jakob, U. Oxidative stress protection by polyphosphate: new roles for an old player. **Curr Opin Microbiol** 2015; 24: 1-6.

4. Dahl, J.-U., **Gray, M.J.**, and Jakob, U. Protein Quality Control Under Oxidative Stress Conditions. **J Mol Biol** 2015; 427(7): 1549-1563.

5. Knoefler, D., Leichert, L.I.O., Thamsen, M., Cremers, C.M., Reichmann, D., **Gray, M.J.**, Wholey, W.-Y., and Jakob, U. About the dangers, costs, and benefits of living an aerobic lifestyle. **Biochem Soc Trans** 2014; 42: 917-921.

6. **Gray, M.J.**, Wholey, W.-Y., Cremers, C.M., Wagner, N.O., Mueller-Schickert, A., Hock, N.T., Krieger, A.G., Smith, E.M., Bender, R.A., Bardwell, J.C.A., and Jakob, U. Polyphosphate is a Primordial Chaperone. **Mol Cell** 2014; 53(5): 689-699. Featured article. F1000Prime recommended article.

   - Preview: Kampinga, H.H. Chaperoned by Prebiotic Inorganic Polyphosphate Molecules: An Ancient Transcription-Independent Mechanism to Restore Protein Homeostasis. **Mol Cell** 2014; 53(5): 685-687.

7. Parker, B.W., Schwessinger, E.A., and Jakob, U, and **Gray, M.J.** The RclR protein is a reactive chlorine-specific transcription factor in *Escherichia coli.* **J Biol Chem** 2013; 288(45): 32574-32584.

8. **Gray, M.J.**, Wholey, W.-Y., and Jakob, U. Bacterial responses to reactive chlorine species. **Annu Rev Microbiol** 2013; 67: 141-60.

9. **Gray, M.J.***, Wholey, W.-Y.*, Parker, B.W., Kim, M., and Jakob, U. NemR is a bleach-sensing transcription factor. **J Biol Chem** 2013; 288(19): 13789-13798.

10. Collins, H.F., Biedendieck, R., Leech, H.K., **Gray, M.**, Escalante-Semerena, J.C., McClean, K.J., Munro, A.W., Rigby, S.E.J., Warren, M.J., and Lawrence, A.D. *Bacillus megaterium* has both a functional BluB protein required for DMB synthesis and a related flavoprotein that forms a stable radical species. **PLoS One** 2013; 8(2): e55708.

11. **Gray, M.J.** and Escalante-Semerena, J.C. A new pathway for the synthesis of α-ribazole-phosphate in *Listeria innocua*. **Mol Microbiol** 2010; 77(6): 1429-1438.

12. **Gray, M.J.** and Escalante-Semerena, J.C. The cobinamide amidohydrolase (cobyric acid-forming) CbiZ enzyme: a critical activity of the cobamide remodeling system of *Rhodobacter sphaeroides*. **Mol Microbiol** 2009; 74(5): 1198-1210.

13. **Gray, M.J.** and Escalante-Semerena, J.C. *In vivo* analysis of cobinamide salvaging in *Rhodobacter sphaeroides* strain 2.4.1. **J Bacteriol** 2009; 191(12): 3842-3851.

14. **Gray, M.J.**, Tavares, N.K., and Escalante-Semerena, J.C. The genome of *Rhodobacter sphaeroides* 2.4.1 encodes functional cobinamide salvaging systems of bacterial and archaeal origins. **Mol Microbiol** 2008; 70(4): 824-836.

15. Noriega, C.E., Schmidt, R., **Gray, M.J.**, Chen, L.-L. and Stewart, V. Autophosphorylation and dephosphorylation by soluble forms of the nitrate-responsive sensors NarX and NarQ from *Escherichia coli* K-12. **J Bacteriol** 2008; 190(11): 3869-3876.

16. **Gray, M.J.** and Escalante-Semerena, J.C. Single-enzyme conversion of $FMNH_2$ to 5,6-dimethylbenzimidazole, the lower ligand of B_{12}. **Proc Natl Acad Sci USA** 2007; 104(8): 2921-2926.

17. **Gray, M.J.**, Freitag, N.E. and Boor, K.J. How the bacterial pathogen *Listeria monocytogenes* mediates the switch from environmental Dr. Jekyll to pathogenic Mr. Hyde. **Infect Immunol** 2006; 74(5): 2505-12.

18. **Gray, M.J.** and Boor, K.J. 2006. Genetics and physiology of pathogenicity in food-borne bacterial pathogens. In: **Food Biotechnology**, 2nd edition. (K. Shetty, G. Paliyath, A. Pometto, and R. E. Levin, eds.) pp. 1293-1327.

19. Chen, Y., Ross, W.H., **Gray, M.J.**, Wiedmann, M., Whiting, R.C., and Scott, V.N. Attributing risk to *Listeria monocytogenes* subgroups: dose response in relation to genetic lineages. **J Food Prot** 2006; 69(2): 335-344.

20. **Gray, M.J.**, Zadoks, R.N., Fortes, E.D., Dogan, B., Cai, S., Chen, Y., Scott, V.N., Gombas, D.E., Boor, K.J. and Wiedmann, M. *Listeria monocytogenes* isolates from foods and humans form distinct but overlapping populations. **Appl Environ Microbiol** 2004; 70(10): 5833-41.

21. Sasahara, K.C., **Gray, M.J.**, Shin, S.J., and Boor, K.J. Detection of viable *Mycobacterium avium* subsp. *paratuberculosis* using luciferase reporter systems. **Foodborne Pathog Dis** 2004; 1(4): 258-266.

22. Ferreira, A., **Gray, M.**, Wiedmann, M. and Boor, K.J. Comparative genomic analysis of the *sigB* operon in *Listeria monocytogenes* and in other Gram-positive bacteria. **Curr Microbiol** 2004; 48(1): 39-46.

23. Douglas, S.A., **Gray, M.J.**, Crandall, A.D. and Boor, K.J. Characterization of chocolate milk spoilage patterns. **J Food Prot** 2000; 63(4): 516-21.

INVITED TALKS

1. Molecular Genetics of Bacteria and Phages Meeting. 2015. Madison, WI.

2. Gordon Research Conference on Stress Proteins in Growth, Development, and Disease. 2013. Mt. Snow Resort, West Dover, VT.

3. Midwest Stress Response and Molecular Chaperone Meeting. 2013. Evanston, IL.

4. Gordon Research Conference on Vitamin B_{12} and Corphins. 2009. Oxford, UK.

POSTERS

1. Molecular Genetics of Bacteria and Phages Meeting. 2015. Madison, WI.
2. Gordon Research Conference on Microbial Stress Response. 2014, Mt. Holyoke, MA.
3. Gordon Research Conference on Stress Proteins in Growth, Development, and Disease. 2013. Mt. Snow Resort, West Dover, VT.
4. Federation of American Societies for Experimental Biology Conference on Mechanisms and Regulation of Prokaryotic Transcription. 2013. Saxton's River, VT.
5. Gordon Research Conference on Microbial Stress Response. 2012, Mt. Holyoke, MA.
6. Federation of American Societies for Experimental Biology Conference on Mechanisms and Regulation of Prokaryotic Transcription. 2011. Saxton's River, VT.
7. Gordon Research Conference on Vitamin B_{12} and Corphins. 2009. Oxford, UK.
8. General Meeting of the American Society for Microbiology. 2009. Philadelphia, PA.
9. Wind River Conference on Prokaryotic Biology. 2006. Wind River, CO. (*Won poster award.*)

TEACHING EXPERIENCE

Summer, 2012 – Fall, 2015: Mentored 7 undergraduate students (Emily Schwessinger, Benjamin Parker, Nico Wagner, Adam Krieger, Nathaniel Hock, Siddhant Dogra, and Mehadi Muhith) through the U. of Michigan mBio and Undergraduate Research Opportunity Programs. (Resulting in undergraduate authorship on publications 6, 7, and 9 above.)

Winter, 2012: Co-designed and taught Microbiology 295, Introduction to Research in the Microbial World (1 credit), along with 3 other postdoctoral research fellows, in the U. of Michigan Microbiology Department.

Fall, 2011: Participated in Postdoctoral Teaching Short Course through the U. of Michigan Center for Research on Learning and Teaching

Summer and Fall, 2011: Mentored undergraduate student (Erica M. Smith) in conducting research on bacterial stress responses at the U. of Michigan, later published in publication 6 above.

Summer, 2009: Mentored undergraduate student (Karla J. Esquilin) in conducting research in microbial physiology as part of UW-Madison Research Experience for Undergraduates in Microbiology program (REU).

Summer, 2009: Co-designed and taught a four-day introduction to fundamental microbiology lab techniques with one other graduate student as part of UW-Madison REU program.

Summer, 2008: Mentored undergraduate student (Becky Thorburn) in conducting research in microbial physiology as part of UW-Madison REU program.

Summer, 2008: Participated in semester-long Mentor Training Seminar with Dr. Jo Handelsman through the Wisconsin Program for Scientific Teaching.

Fall, 2007: Teaching Assistant responsible for leading weekly discussion sections and grading exams in introductory-level undergraduate microbiology lecture course.

Fall, 2006 and Spring, 2007: Participated, along with a group of faculty, post-docs, and graduate students, in the design of a new introductory-level microbiology course, emphasizing the implementation of active learning techniques.

Fall, 2006: Teaching Assistant responsible for preparing and delivering lectures, teaching microbiology techniques, and grading for twice-weekly sections in introductory-level undergraduate microbiology laboratory course.

Spring, 2005: Teaching Assistant responsible for grading, holding office hours, and delivering one lecture in a graduate-level survey course in prokaryotic molecular biology.

OTHER EXPERIENCE

Peer Reviewer

Journal of Bacteriology
Molecular Microbiology
Scientific Reports
Journal of Applied Microbiology
Environmental Science & Technology
Antonie van Leeuwenhoek Journal of Microbiology
PLOS One
PLOS Pathogens

PROFESSIONAL MEMBERSHIPS

American Society for Microbiology (1998 - present)
Howard Hughes Medical Institute Teaching Fellow (2008 - 2009)