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Research Interests

Chemosensory regulation of Gene Expression and Motility in *Myxococcus xanthus*.
Mechanism of Chemotaxis in *Bacillus subtilis*.

Education

1992 B.S. Biochemistry, University of Illinois at Urbana-Champaign.
1998 Ph.D. Biochemistry, University of Illinois at Urbana-Champaign.
Advisor: Professor George Ordal.
Thesis: Regulation and role of methylation during chemotaxis in *Bacillus subtilis*.

Academic Experience

1998-2002 Postdoctoral research, University of California, Berkeley.
Mentor: Professor David Zusman.
Research: Chemotaxis and development in *Myxococcus xanthus*.
2002-present Assistant Professor, School of Biology, Georgia Institute of Technology.

Awards

1991 Tutor of the Year Award, Office of Minority Student Affairs, UIUC.
1992 Outstanding Teaching Assistant Award, Accelerated General Chemistry Program, UIUC.
1993 Outstanding Teaching Assistant Award, Accelerated General Chemistry Program, UIUC.
2004 Dean Griffin Day "Go the Extra Mile Award", Georgia Tech.

Grants

1998-2001 NIH Postdoctoral Fellowship.
2004-2009 NIH RO1 "Chemosensory Regulation of Bacterial Gene Expression", sole PI, Total costs: \$1,456,880.

Academic Service

American Society for Microbiology: Division J, Ultrastructure and Function, Chair-elect, 2005.
Cold Spring Harbor Laboratory: Advanced Bacterial Genetics, Instructor, 2006-2010.
Reviewer: *Journal of Bacteriology*.
Ad hoc Reviewer: *Molecular Microbiology*, *Trends in Microbiology*, *FEMS Microbial Letters*, *Microbiology*,
Archives of Microbiology, *Biofilms*.

Teaching Experience

1990-1991	Chemistry Tutor Coordinator, Office of Minority Student Affairs, UIUC.
1992-1993	Teaching Assistant, Accelerated General Chemistry Program, UIUC.
1993-1995	School of Chemical Sciences Teaching Assistant Orientation Program Coordinator, UIUC.
1998	Teaching Assistant, Biochemistry Laboratory, UIUC.
2003, Spring	Advanced Microbial Physiology, Georgia Tech.
2004, Spring	Advanced Microbial Physiology, Georgia Tech.
2004, Fall	Microbiology Project Laboratory, Georgia Tech.
2005, Spring	Introduction to Microbiology, Georgia Tech.
2005, Fall	Introduction to Microbiology, Georgia Tech.
2005, Fall	Foundations in Molecular Biology, Georgia Tech.

Publications

- Rao, CV, **Kirby, JR**, and Arkin, AP. (2005) Phosphatase Localization in Bacterial Chemotaxis: Divergent Mechanisms, Convergent Principles. *Phys. Biol.* **2**: 148-158.
- Vlamakis, HC, **Kirby, JR**, and Zusman, DR. (2004) The Che4 Pathway of *Myxococcus xanthus* Regulates Type IV Pilus Mediated Motility. *Mol. Microbiol.* **52**: 1799-1811.
 - Photomicrographs from this article were featured on the cover of the issue of *Molecular Microbiology* in which it appears (2004, **52**, no. 6).
- Rao, CV, **Kirby, JR**, and Arkin, AP. (2004) Design and Diversity in Bacterial Chemotaxis: A Comparative Study of *Escherichia coli* and *Bacillus subtilis*. *PLoS Biology* **2**: 239-252.

The above article was featured in the following two articles:

 - "Comparing the Networks that Power Bacterial Chemotaxis" (2004) *PLoS Biology* **2**: 144.
 - Stelling, J. (2004) "Mathematical models in microbial systems biology" *Curr Opin Microbiol* **7**: 513-8. The article was given "••" for "outstanding interest".
- Kirby, JR** and Zusman, DR. (2003) Chemosensory Regulation of Developmental Gene Expression in *Myxococcus xanthus*. *Proc. Natl. Acad. Sci. USA.* **100**: 2008-2013.

This above article was featured in the following two articles:

 - Armitage JP. (2003) Taxing questions in development. *Trends Microbiol* **11**: 239-242.
 - Kaplan HB. (2003) Multicellular development and gliding motility in *Myxococcus xanthus*. *Curr Opin Microbiol* **6**: 572-7. The article was given "••" for "outstanding interest".
- Kirby, JR**, Kristich, CJ, Saulmon, MM, Zimmer, MA, Garrity, LF, Zhulin, IB, and Ordal, GW. (2001) CheC is Related to the Family of Flagellar Switch Proteins and Acts Independently from CheD to Control Chemotaxis in *Bacillus subtilis*. *Mol. Microbiol.* **42**: 573-585.
- Kirby, JR**. (2001) Chemotaxis genes, Fibrils, and PE taxis in *Myxococcus xanthus*. *Trends Microbiol.* **9**: 205.
- Kirby, JR**, Niewold TB, Maloy S, and Ordal GW. (2000) CheB is required for behavioural responses to negative stimuli during chemotaxis in *Bacillus subtilis*. *Mol. Microbiol.* **35**: 44-57.
- Kirby, JR**, Saulmon MM, Kristich CJ, and Ordal GW. (1999) CheY-dependent methylation of the asparagine receptor, McpB, during chemotaxis in *Bacillus subtilis*. *J. Biol. Chem.* **274**: 11092-11100.
- Ordal, GW and **Kirby, JR**. (1999) Chemotaxis. In *The Encyclopedia of Molecular Biology* (T. Creighton, ed.), John Wiley & Sons, New York, Vol 1, pp. 413-415.
- Ordal, GW and **Kirby, JR**. (1999) Protein Methylation. In *The Encyclopedia of Molecular Biology* (T. Creighton, ed.), John Wiley & Sons, New York, Vol 3, pp. 1486-1488.
- Ordal, GW and **Kirby, JR**. (1999) Methyltransferase. In *The Encyclopedia of Molecular Biology* (T. Creighton, ed.), John Wiley & Sons, New York, Vol 3, pp. 1491-1492.
- Ordal, GW and **Kirby, JR**. (1999) Transducer Proteins. In *The Encyclopedia of Molecular Biology* (T. Creighton, ed.), John Wiley & Sons, New York, Vol 4, pp. 2593-2595.
- Kirby, JR**, Kristich, CJ, Feinberg, SL, and Ordal, GW. (1997) Methanol Production During Chemotaxis to Amino Acids in *Bacillus subtilis*. *Mol. Microbiol.* **24**: 869-878.

14. Rosario, MML, **Kirby, JR**, Bochar, DA, and Ordal, GW. (1995) Chemotactic Methylation and Behavior in *Bacillus subtilis*: Role of Two Unique Proteins, CheC and CheD. *Biochemistry* 34: 3823-3831.
15. Kirsch, ML, Peters, PD, Hanlon, DW, **Kirby, JR**, and Ordal, GW. (1993) Chemotactic Methyltransferase Promotes Adaptation to High Concentrations of Attractant in *Bacillus subtilis*. *J. Biol. Chem.* 268: 18610-18616.
16. Thoelke, MS, **Kirby, JR**, and Ordal, GW. (1989) Novel Methyl Transfer During Chemotaxis in *Bacillus subtilis*. *Biochemistry* 28: 5585-5589.
17. Ordal, GW, Parker, HM, and **Kirby, JR**. (1985) Complementation and Characterization of Chemotaxis Mutants of *Bacillus subtilis*. *J. Bacteriol.* 164: 802-810.

Manuscripts submitted:

18. Nierman, WC, Kaiser, D, Goldman, BS, *et Kirby, JR, et al.* Myxobacteria, decyphering multicellular development in a predator (submitted to *Science*).
19. Müller, S, Shen, H, Hofmann, D, Schairer, HU, and **Kirby, JR**. Integration into the Phage Attachment Site, *attB*, Impairs Multicellular Differentiation in *Stigmatella aurantiaca* (in revision, *Journal of Bacteriology*).

Manuscripts in preparation:

20. Berleman, JE and **Kirby, JR**. CheA-CrdA Phosphotransfer Regulates Developmental Gene Expression in *Myxococcus xanthus*.
21. Müller, S and **Kirby, JR**. Characterization of the Periplasmic Signaling Components of the Che3 System in *Myxococcus xanthus*.
22. Scott, JC and **Kirby, JR**. C-signal Dependent Aggregation Requires the Che6 Chemosensory System in *Myxococcus xanthus*.
23. Wilson, JM and **Kirby, JR**. Multicellular Development Requires the Che7 Chemosensory System in *Myxococcus xanthus*.
24. Leclerc, M, Müller, S, and **Kirby, JR**. Riboflavin Biosynthesis and Secretion is Regulated by the Che8 Chemosensory System in *Myxococcus xanthus*.
25. Henry, SJ, Löffler, F, and **Kirby, JR**. Development of a genetic system for a Uranium-reducing Myxobacterium, *Anaeromyxobacter dehalogenans*.

Book chapters in preparation:

26. **Kirby, JR**, and Berleman, JE. "Chemosensory systems in *Myxococcus xanthus*" in *Multicellularity and Differentiation Among the Myxobacteria and Their Neighbors*, Eds. Kaplan, H and Whitworth, D. ASM Press.
27. **Kirby, JR**, and Zhulin, IB. "Functional genomics" in *Methods in Enzymology*, Ed. K Hughes. Academic Press.

Conferences and Seminars**Invited Talks**

- 1997 BLAST IV: Bacterial Locomotion and Signal Transduction
- 1998 Gordon Research Conference: Sensory Transduction in Microorganisms
- 1999 West Coast Prokaryotic Physiology Meeting
- 1999 International Meeting on Myxobacteria
- 2000 International Meeting on Myxobacteria
- 2000 Gordon Research Conference: Sensory Transduction in Microorganisms
- 2001 International Meeting on Myxobacteria
- 2001 American Society for Microbiology – Cell-Cell Communication
- 2001 BLAST VI: Bacterial Locomotion and Signal Transduction
- 2002 Gordon Research Conference: Sensory Transduction in Microorganisms
- 2002 International Meeting on Myxobacteria
- 2003 BLAST VII: Bacterial Locomotion and Signal Transduction
- 2003 International Meeting on Myxobacteria
- 2003 Bacteria and Phage Meeting
- 2004 Gordon Research Conference: Sensory Transduction in Microorganisms
- 2004 International Meeting on Myxobacteria
- 2005 Southeast Regional Myxobacteria Meeting
- 2005 Cold Spring Harbor Laboratory
- 2005 American Society for Microbiology – Prokaryotic Development
- 2005 Analytical Genetics Meeting

Contributed

- 1996 Gordon Research Conference: Sensory Transduction in Microorganisms
- 1999 BLAST V: Bacterial Locomotion and Signal Transduction
- 2000 American Society for Microbiology – General Meeting
- 2002 American Society for Microbiology – General Meeting
- 2002 American Society for Microbiology – Prokaryotic Development
- 2003 American Society for Microbiology – General Meeting
- 2003 DOE: Genomes to Life
- 2003 European Conference on Prokaryotic Genomes
- 2003 American Society for Microbiology – Biofilms
- 2003 International Conference on Bioinformatics
- 2004 American Society for Microbiology – General Meeting
- 2005 BLAST VIII: Bacterial Locomotion and Signal Transduction
- 2005 American Society for Microbiology – General Meeting

Departmental Seminars

- 1999 Loma Linda University
- 1999 University of California, Berkeley
- 2001 Virginia Polytechnic Institute
- 2001 University of Illinois, Urbana-Champaign
- 2001 University of California, Berkeley (Guest Lecturer)
- 2001 Penn State University
- 2002 Georgia Institute of Technology
- 2002 University of Texas, Austin
- 2002 Institut für Mikrobiologie, Giesen, Germany
- 2003 University of Georgia, Athens
- 2003 Center for Microbial Sciences, San Diego State University
- 2003 Institut für Mikrobiologie, Giesen, Germany
- 2003 Georgia State University
- 2004 University of California, Santa Cruz

Departmental Seminars (continued)

2004 Emory University

2004 University of Tromsø, Norway

2004 Georgia Institute of Technology, Bioinformatics and Computational Biology Series

Service – Georgia Tech:

Graduate Committee (2004 - present)

NSF-IGERT Program (2003 - present)

NSF-REU Program (2005)

Thesis Committees:

1. Roger Alexander (Biology)
2. Buxin Chen (Biology)
3. Jason Dale (Biology)
4. Sara Henry (Civil & Environmental Engineering)
5. Ying Liu (Biology)
6. Rob Martinez (Biology)
7. Lance Miller (Biology)
8. Amanda Payne (Biology)
9. Gail Rosen (Electrical & Computer Engineering)
10. Jodie Scott (Biology)
11. Chris Thompson (Biology)
12. Ivy Thompson (Biology)
13. Janet Wilson (Biology)
14. Kristen Wuichet (Biology)

Postdoctoral Fellows Supervised

2002-2004 Marion Leclerc, PhD. Assistant Professor, Institut National de le Recherché Agronomique (INRA)-France.

2004-present James Berleman, PhD., Indiana University.

2005-present Susanne Müller, PhD., Heidelberg, Germany.

Grad Students Supervised

2002-present Sara Henry

2002-2003 Sally Hunziker

2003-present Janet Wilson

2004 Kelly McCann

2005-present Jodie Scott

2005-present Di Li

Undergraduate Students Supervised

2002-2004 Kate Flowe

2004-2005 Margaret Hall

2005-present Hsu-Ming Wen

2005-present Tatiana Chumley

2005-present Erin Epperson

Professional Societies

1997-present American Society for Microbiology

1997-present American Association for the Advancement of Science

The following Professors have agreed to provide letters:

Robert B. Bourret
Associate Professor
Department of Microbiology & Immunology
University of North Carolina
Chapel Hill, NC.
bourret@med.unc.edu
919.966.2679

Patricia Hartzell
Professor & Head
Department of Microbiology, Molecular Biology &
Biochemistry
University of Idaho
Moscow, ID.
hartzell@uidaho.edu
208.885.0572

John D. Helmann
Professor
Department of Microbiology
Cornell University
Ithaca, NY
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Stanley Maloy
Professor of Biology
Director, Center for Microbial Sciences
San Diego State University
San Diego, CA.
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George W. Ordal
Emeritus Professor
Department of Biochemistry
University of Illinois at Urbana-Champaign
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217.333.9098

Igor B. Zhulin (Jouline)
Associate Professor and Senior R&D Staff Member
Joint Institute for Computational Sciences
University of Tennessee – Oak Ridge National
Laboratory
Oak Ridge, TN
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Steven S. Zumdahl
Emeritus Professor
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