

CURRICULUM VITAE
Igor B. JOULINE (ZHULIN)

Academic position

Distinguished R&D Staff Member, Computer Science & Mathematics Division, Oak Ridge National Laboratory
Joint Faculty Professor, Department of Microbiology, University of Tennessee

Research interests

Protein sequence analysis (protein domain discovery and function prediction; computational analysis of protein-protein interactions)

Computational genomics (computational genomics of signal transduction; whole-genome reconstructions; inter-genome comparisons)

Molecular evolution (molecular evolution of signal transduction pathways; molecular evolution of protein domains)

Bioinformatics applications for high-performance computing (Hidden Markov model and profile searches, multiple sequence alignment, phylogenetics)

Educational background

1983 **B.S./M.S.** (*magna cum laude*) in Biology/Biochemistry & Biophysics, Saratov State University, USSR
1988 **Ph.D.** in Microbiology, St. Petersburg (Leningrad) State University, USSR

Academic and professional experience

1987-1990 **Research Associate**, Institute of Biochemistry and Physiology of Plants and Microorganisms, USSR Academy of Sciences, Saratov, USSR
1988 **Interim Assistant Director**, Institute of Biochemistry and Physiology of Plants and Microorganisms, USSR Academy of Sciences, Saratov, USSR
1990-1991 **Postdoctoral Research Associate**, Microbiology Unit, Department of Biochemistry, University of Oxford, United Kingdom
1992-1996 **Postdoctoral Fellow**, Department of Microbiology and Molecular Genetics, School of Medicine, Loma Linda University, California
1996-1999 **Research Assistant Professor**, Department of Microbiology and Molecular Genetics, School of Medicine, Loma Linda University, California
1997 **Visiting Scholar**, Center for Microbial and Plant Genetics, KU Leuven, Belgium
1999-2000 **Assistant Professor**, Department of Microbiology and Molecular Genetics, School of Medicine, Loma Linda University, California
2000-2005 **Assistant Professor**, Center for Bioinformatics and Computational Biology, School of Biology, Georgia Institute of Technology, Atlanta, Georgia

- 2005-2008 **Associate Professor**, Department of Microbiology, University of Tennessee, Knoxville, TN
- 2005-2009 **Senior R&D Staff Member**, Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN
- 2008-present **Joint Faculty Professor**, Department of Microbiology, University of Tennessee, Knoxville, TN
- 2009-present **Distinguished R&D Staff Member**, Computer Science and Mathematics Division, Oak Ridge National Laboratory, Oak Ridge, TN

Honors and awards

- 1978 Winner, State (Russian Federation) Biology Science Olympiad for high school students, Perm, USSR
- 1978 Runner-up, National (USSR) Biology Science Olympiad for high school students, Kishinev, USSR
- 1983 Runner-up, National (USSR) Biochemistry and Molecular Biology Competition for college students "*Student i nauchno-technicheski progress*", Novosibirsk, USSR
- 1990 A Wellcome Trust Young European Investigator award, London, United Kingdom
- 2006 Plenary speaker, Systems Biology & Bioinformatics Symposium, Biomedical Engineering Society Annual Meeting BMES 2006, Chicago, Illinois
- 2007 Co-chair, IEEE 7th International Symposium on Bioinformatics & Bioengineering (BIBE) Special Workshop, 2007, Cambridge, Massachusetts
- 2007 Outstanding Academic Service Award in Bioinformatics and Bioengineering, IEEE Systems, Man & Cybernetics Society.
- 2009 Plenary speaker, Annual "Science Days" Meeting of the Swiss Institute for Bioinformatics, Fribourg, Switzerland

Academic societies

- 1996-present American Society for Microbiology
- 2002-present American Association for the Advancement of Science
- 2006-present International Society for Computational Biology

Academic service

NATIONAL AND INTERNATIONAL FUNDING AGENCIES

- 2008 Chairperson, NIH Center for Scientific Review "Biodata Management and Analysis" Study Section (BDMA)
- 2008 NIH Special Emphasis Panel ZRG1 GGG-J (52) M "Human Microbiome Project References"
- 2007-2009 Chairperson, NIH Special Emphasis Panel ZRG1 BST-D (10) B "Small Business: Bioinformatics & Software Development"
- 2007 Session Chair, NIH Center for Scientific Review Open House Workshop "Biomolecular Integrated Review Groups: Biological Chemistry and Macromolecular Biophysics, Bioengineering Sciences and Technologies, Cell Biology, and Genes, Genomes and

Genetics”

2007 Ad hoc reviewer, German Israeli Foundation for Scientific Research (GIF)

2007 Ad hoc reviewer, Human Frontiers Science Program (HFSP)

2006-2009 Morrison Rogosa Award Committee, American Society for Microbiology

2006 DOE subcommittee, FASEB Federal Funding Recommendations for FY2008

2006 Ad hoc reviewer, US-Israel Binational Science Foundation (BSF)

2004-2009 Standing member, NIH Center for Scientific Review “Biodata Management and Analysis” Study Section (BDMA)

2005 NSF-USDA Microbial Genome Sequencing Program Panel

2004 NIH/NIAID Special Emphasis Panel “Biodefense Proteomics Research Programs”

2004 NIH/NIAID Special Emphasis Panel “Biodefense and SARS Product Development”

2004 Ad hoc reviewer, NIH/NIGMS Minority Biomedical Research Support Program

2003, 2006 Ad hoc reviewer, US/Israel Binational Agricultural Research and Development Fund (BARD)

2002-present Ad hoc reviewer, NSF

2002-present Registered reviewer, Biotechnology & Biological Sciences Research Council (UK)

INTERNATIONAL SCIENTIFIC PEER-REVIEW PUBLICATIONS

2008 Editor, *Journal of Bacteriology*

2005-present Editorial Board, *Biology Direct*

2004-2008 Editorial Board, *Journal of Bacteriology*

1996-present Ad hoc journal reviewer:

Proceedings of the National Academy of Sciences of the USA

Microbiology and Molecular Biology Reviews

PLoS Biology

PLoS Genetics

PLoS Computational Biology

Trends in Biochemical Sciences

Trends in Genetics

Trends in Microbiology

Molecular and Cell Biology

Nucleic Acids Research

Bioinformatics

Proteins: Structure, Function and Bioinformatics

Biology Direct

Molecular Microbiology

Journal of Bacteriology

FEBS Letters

Applied and Environmental Microbiology

Journal of Clinical Microbiology

Microbiology

Bulletin of Mathematical Biology

FEMS Microbiology Letters

2004 Ad hoc reviewer: *Essentials of Bioinformatics* (Jin Xiong. Cambridge University Press)

Teaching Experience

Term/Year	Course #	Course title	Enrollment
Spring, 2009	Micro480/540/LS507	Bioinformatics and Genomics	15
Spring, 2008	LS507	Advances in Computational Biology	16
Fall, 2007	Micro480/540/LS507	Bioinformatics and Genomics	26
Spring, 2007	LS507	Advances in Computational Biology	16
Spring, 2007	LS615	Bioinformatics Journal Club	5
Fall, 2006	Micro480/540/LS507	Bioinformatics and Genomics	25
Spring, 2006	LS615	Bioinformatics Journal Club	22
Fall, 2004	BIOL8803	Bioinformatics and Genomics	24
Spring, 2004	BIOL3310	Introductory Microbiology	32
Fall, 2003	BIOL4803/8803	Bioinformatics and Genomics	37
Spring, 2003	BIOL4803/8803	Bioinformatics and Genomics	49
Fall, 2002	BIOL4390	Microbiology Project Lab	18
Summer, 2002	BIOL3310	Introductory Microbiology	15
Spring, 2002	BIOL4803	Bioinformatics and Genomics	33
Spring, 2002	BIOL8001	Seminar	15
Spring, 2001	BIOL 3310	Introductory Microbiology	12
Spring, 2000	MICRO 545	Bioinformatics and Genomics	24
Fall, 1999	MICRO510	Colloquium in Microbiology	11
Spring, 1999	MICRO545	Bioinformatics and Genomics	15

Refereed Publications

total number of citations: 2,409 (data from Thompson ISI April 20, 2008); *h*-index, 26

65. Rekapalli, B., C. Halloy, and **I. B. Zhulin***. 2009. HSP-HMMER: a tool for protein domain identification on a large scale. *Proceedings of the 24th Annual ACM Symposium on Applied Computing (SAC) Honolulu, Hawaii*: 166-168.

64. Anderson, I., L. Dharmarajan, J. Rodriguez, I. Porat, L. E. Ulrich, J. G. Elkins, K. Mavromatis, H. Sun, M. Land, A. Lapidus, S. Lucas, A. Copeland, H. Huber, **I. B. Zhulin**, W. Whitman, B. Mukhopadhyay, and N. Kyrpides. 2009. Genome of the Crenarchaela hyperthermophile *Staphylothermus marinus*. *BMC Genomics* 10: 145.

63. **Zhulin, I. B.***. 2009. It is computation time for bacteriology! *Journal of Bacteriology* 191: 20-22.

- Invited Guest Commentary for the new “Computational Biology” section of the journal

62. Elliott, K. T., **I. B. Zhulin**, J. A. Stuckey, and V. J. DiRita. 2009. Conserved residues in the HAMP domain define a new family of proposed bipartite energy taxis receptors. *Journal of Bacteriology* 191: 375-387.

61. Fredrickson, J. K., M.F. Romine, A. S. Beliaev, J. M. Auchtung, M. E. Driscoll, T. S. Gardner, K. H. Nealson, A. L. Osterman, G. Pinchuk, J. L. Reed, D. A. Rodionov, J. L. Rodrigues, D. A.

Saffarini, M. H. Serres, A. M. Spormann, **I. B. Zhulin**, and J. M. Tiedje. 2008. Towards environmental systems biology of *Shewanella*. *Nature Reviews of Microbiology* 6: 592-603.

60. Werner, R. M., L. E. Taylor 2nd, B. Henrissat, L. Hauser, M. Land, P. M. Coutinho, C. Rancurel, E. H. Saunders, A. G. Longmire, H. Zhang, E. A. Bayer, H. J. Gilbert, F. Larimer, **I. B. Zhulin**, N. A. Ekborg, R. Lamed, P. M. Richardson, I. Borovok, and S. Hutcheson. 2008. Complete genome sequence of the complex carbohydrate-degrading marine bacterium *Saccharophagus degradans* strain 2-40 T. *PLoS Genetics* 4: e1000087.

59. Anderson, I., J. Rodriguez, D. Susanti, I. Porat, C. Reich, L. E. Ulrich, J. Elkins, K. Mavromatis, A. Lykidis, E. Kim, L.S. Thompson, M. Nolan, M. Land, A. Copeland, A. Lapidus, S. Lucas, C. Detter, P. Richardson, **I. B. Zhulin**, W. Whitman, B. Mukhopadhyav, C. Woese and N. Kyrpides. 2008. Genome sequence of the Crenarchaeal hyperthermophile *Thermofilum pendens* reveals an unprecedented loss of biosynthetic pathways in a free-living organism. *Journal of Bacteriology* 190: 2957-2965.

58. Belas, R., **I. B. Zhulin** and Z. Yang. 2008. Bacterial sensing and motility: sure bets. *Journal of Bacteriology* 190: 1849-1856.

- A meeting review, the IX International Conference on Bacterial Locomotion and Signal Transduction (BLAST IX)

57. Borziak, K. and **I.B. Zhulin***. 2007. FIST: a sensory domain for diverse signal transduction pathways in prokaryotes and ubiquitin signaling in eukaryotes. *Bioinformatics* 23: 2518-2521.

56. Alexander, R.P. and **I.B. Zhulin***. 2007. Evolutionary genomics reveals conserved structural determinants of signaling and adaptation in microbial chemoreceptors. *Proceedings of the National Academy of Sciences of the USA* 104: 2885-2890.

- Featured on the journal cover.
- Featured in the PNAS "In This Issue" section.
- Featured in the PNAS commentary: 2007, 104: 2559-2560.
- Press release by the University of Tennessee

55. Wuichet, K., R.P. Alexander, and **I.B. Zhulin***. 2007. Comparative genomic and protein sequence analyses of a complex system controlling bacterial chemotaxis. *Methods in Enzymology* 422: 3-31.

54. Ulrich, L.E and **I.B. Zhulin**. 2007. MiST: a Microbial Signal Transduction database. *Nucleic Acids Research* 35: D386-D390.

- Featured in *Faculty of 1000* as a top 10 "hidden jewels" (selected by Prof. Stephen Spiro, University of Texas-Dallas).

53. Chain, P.S.G., V.J. Deneff, K. Konstantinidis, L.M. Vergez, L. Agullo, V.L. Reyes, L. Hauser, M. Cordova, L. Gomez, M. Gonzalez, M. Land, V. Lao, F. Larimer, J.J. LiPuma, E. Mahenthalingam, S.A. Malfatti, C.J. Marx, J.J. Parnell, A. Ramette, P. Richardson, M. Seeger, D. Smith, T. Spilker, W.J. Sul, T.V. Tsoi, L.E. Ulrich, **I.B. Zhulin**, and J.M. Tiedje*. 2006. *Burkholderia xenovorans* LB400 harbors a multi-replicon, 9.73 M bp genome shaped for versatility *Proceedings of the National Academy of Sciences of the USA* 103: 15280-15287.

52. Ulrich*, L.E. and **I.B. Zhulin**. 2005. Four-helical bundle: a ubiquitous sensory module in prokaryotic signal transduction. *Bioinformatics* 21 Suppl 3: iii45-iii48.

51. Wu, M., Q. Ren, A. S. Durkin, S. C. Daugherty, L. M. Brinkac, R. J. Dodson, R. Madupu, S. A. Sullivan, J. F. Kolonay, W. Nelson, L. J. Tallon, K. M. Jones, L. E. Ulrich, J. M. Gonzalez, **I. B. Zhulin**, F. T. Robb and J. A. Eisen*. 2005. Life in hot carbon monoxide: the complete genome sequence of *Carboxydothemus hydrogenoformans* Z-2901. *PLoS Genetics* 1: e65.

- Featured in the press release and wire news.

50. Ulrich, L.E., E.V. Koonin and **I.B. Zhulin***. 2005. One-component regulators dominate signal transduction in prokaryotes. *Trends in Microbiology* 13: 52-56.

- Featured on the journal cover.
- 74 citations

49. Alexandre*, G. and **I.B. Zhulin**. 2004. Ecological role of energy taxis. *FEMS Microbiology Reviews* 28: 113-126.

- Invited review.

48. **Zhulin, I.B.*** 2004. Digging with experimental pick and computational shovel: a new addition to the histidine kinase superfamily. *Journal of Bacteriology* 186: 267-269.

- Commentary solicited by the Editor-in-Chief.

47. Mazzag, B., **I.B. Zhulin** and A. Mogilner*. 2003. Model of bacterial band formation in aerotaxis. *Biophysical Journal* 85: 3558-3574.

46. Phillips-Greer, S.E., Alexandre, G., Taylor, B.L. and **I.B. Zhulin***. 2003. Aer and Tsr guide *Escherichia coli* in spatial gradients of oxidizable substrates. *Microbiology* 149: 2661-2667.

- Featured in *Faculty of 1000* (selected by George W. Ordal, University of Illinois, Urbana-Champaign).

45. Wuichet, K. and **I.B. Zhulin***. 2003. Molecular evolution of sensory domains in cyanobacterial chemoreceptors. *Trends in Microbiology* 11: 200-203.

44. Shu, C.J., L.E. Ulrich and **I.B. Zhulin***. 2003. The NIT domain: a predicted nitrate responsive module in bacterial sensory receptors. *Trends in Biochemical Sciences* 28: 121-124.

43. Alexandre, G. and **I. B. Zhulin***. 2003. Different evolutionary constraints on CheW and CheY proteins revealed by heterologous expression studies and protein sequence analysis. *Journal of Bacteriology* 185: 544-552.

42. **Zhulin, I.B.***, A. Nikolskaya and M. Y. Galperin. 2003. Common sensory domains in transmembrane receptors for diverse signal transduction pathways in Bacteria and Archaea. *Journal of Bacteriology* 185: 285-294.

41. Shiomi, D., **I. B. Zhulin**, M. Homma and I. Kawagishi*. 2002. Dual recognition of the bacterial chemoreceptor by chemotaxis-specific domains of the CheR methyltransferase. *Journal of*

Biological Chemistry 277: 42325-42333.

40. Sun, X., **I. Zhulin** and R. M. Wartell*. 2002. Predicted structure and phyletic distribution of the RNA binding protein Hfq. *Nucleic Acids Research* 30: 3662-3671.

39. Perelygin, A.A., S.V. Scherbik, **I.B. Zhulin**, B.M. Stockman, Y. Li and M.A. Brinton*. 2002. Positioning cloning of the murine flavivirus resistance gene. *Proceedings of the National Academy of Sciences of the USA* 99: 9322-9327.

- Featured in the *PNAS* commentary: 2002, 99: 11555-11557.
- Featured in *Scientific American*. News on-line, August 20, 2002.
- Featured in *The Lancet* News. 2002, 360: 624.
- Featured in *Faculty of 1000* (selected by David Relman, Stanford University)
- 95 citations

38. Hauwaerts, D., G. Alexandre, S. Das, J. Vanderleyden and **I.B. Zhulin***. 2002. A major chemotaxis gene cluster in *Azospirillum brasilense* and relationships between chemotaxis operons in α -proteobacteria. *FEMS Microbiology Letters* 208: 61-67.

37. Shu, C.J. and **I.B. Zhulin***. 2002. ANTAR: an RNA-binding domain in transcription antitermination regulatory proteins. *Trends in Biochemical Sciences* 27: 3-5.

36. Aizawa, S.-I., **I. B. Zhulin**, L. Marquez-Magana and G. W. Ordal*. 2002. Chemotaxis and Motility, pp. 437-452. In A. L. Sonenshein et al. (Ed.). *Bacillus subtilis* and Its Closest Relatives: from Genes to Cells. ASM Press, Washington, DC.

35. Iyer, L. M., L. Aravind, P. Bork, K. Hoffmann, A. R. Mushegian, **I. B. Zhulin**, and E. V. Koonin*. 2001. *Quod erat demonstrandum?* The mystery of experimental validation of apparently erroneous computational analyses of protein sequences. *Genome Biology* 2: research0051.1-0051.11.

34. Kirby, J. R., C. J. Kristich, M. M. Saulmon, L. F. Garrity, **I. B. Zhulin**, and G. W. Ordal*. 2001. CheC is related to the family of flagellar switch proteins and acts independently from CheD to control chemotaxis in *Bacillus subtilis*. *Molecular Microbiology* 42: 573-585.

33. Mougel, C. and **I. B. Zhulin***. 2001. CHASE: an extracellular sensing domain common to transmembrane receptors from prokaryotes, lower eukaryotes and plants. *Trends in Biochemical Sciences* 26: 582-584.

32. Alexandre, G. and **I. B. Zhulin***. 2001. More than one way to sense chemicals. *Journal of Bacteriology* 183: 4681-4686.

31. **Zhulin***, **I. B.** 2001. The superfamily of chemotaxis transducers: from physiology to genomics and back. *Advances in Microbial Physiology* 45: 157-198.

- 62 citations

30. Alexandre, G., S. E. Greer, and **I. B. Zhulin***. 2000. Energy taxis is the dominant behavior in *Azospirillum brasilense*. *Journal of Bacteriology* 182: 6042-6048.

29. Repik, A. V., A. Rebbapragada, M. S. Johnson, J. O. Haznedar, **I. B. Zhulin** and B. L. Taylor*. 2000. PAS domain residues involved in signal transduction by the Aer redox sensor of *Escherichia coli*. *Molecular Microbiology* 36: 806-816.
- 59 citations
28. **Zhulin***, **I. B.** 2000. Novel phototaxis receptor hidden in the cyanobacterial genome. *Journal of Molecular Microbiology and Biotechnology* 2: 491-493.
27. Alexandre, G., and **I. B. Zhulin***. 2000. Laccases are widespread in bacteria. *Trends in Biotechnology* 18: 41-42.
- 93 citations
26. Alexandre, G., R. Bally, B. L. Taylor and **I. B. Zhulin***. 1999. Loss of cytochrome *c* oxidase activity and acquisition of resistance to exogenous quinones in a laccase-positive variant of *Azospirillum lipoferum*. *Journal of Bacteriology* 181:6730-6738.
25. Taylor*, B. L., **I. B. Zhulin**, and M. S. Johnson. 1999. Aerotaxis and related responses in bacteria. *Annual Reviews in Microbiology* 53:103-128.
- 81 citations
24. Taylor*, B. L., and **I. B. Zhulin**. 1999. PAS domains: internal sensors of oxygen, redox potential and light. *Microbiology and Molecular Biology Reviews* 63:479-506.
- Featured in a book “Quest: The Essence of Humanity” by Charles A. Pasternak as an important scientific contribution to our understanding of evolution.
 - 647 citations (in the top 15 most cited MMBR papers)
23. **Zhulin, I. B.***, and B. L. Taylor. 1998. Correlation of PAS domains with electron transport-associated proteins in completely sequenced microbial genomes. *Molecular Microbiology* 29:1522-1523.
22. Taylor*, B. L., and **I. B. Zhulin**. 1998. In search of a higher energy: metabolism-dependent behavioral responses in bacteria. *Molecular Microbiology* 28: 683-690.
21. Rebbapragada, A., M. S. Johnson, G. P. Harding, A. J. Zuccarelli, H. M. Fletcher, **I. B. Zhulin**, and B. L. Taylor*. 1997. The Aer protein and the serine chemoreceptor Tsr independently sense intracellular energy levels and transduce oxygen, redox, and energy signals for *Escherichia coli* behavior. *Proceedings of the National Academy of Sciences of the USA* 94:10541-10546.
- Featured in the *PNAS* commentary: 1997, 94: 10487-10489.
 - 129 citations.
20. **Zhulin, I. B.**, B. L. Taylor*, and R. Dixon. 1997. PAS domain S-boxes in Archaea, Bacteria and sensors for oxygen and redox. *Trends in Biochemical Sciences* 22:331-333.
- Featured in TIBS editorial as one of the 10 most cited protein domains described in the Protein Motif Section of the journal: 2004, 29:627-633.
 - 242 citations.
19. Johnson, M. S., **I. B. Zhulin**, E. Gapuzan, and B. L. Taylor*. 1997. Oxygen dependent

growth of the obligate anaerobe *Desulfovibrio vulgaris* Hildenborough. *Journal of Bacteriology* 179:5598-5601.

- 56 citations

18. **Zhulin, I. B.***, Johnson, M. S., and B. L. Taylor. 1997. How do bacteria avoid high oxygen concentrations? *Bioscience Reports* 17:335-342.

17. **Zhulin, I. B.**, Rowsell, E. H., Johnson, M. S., and B. L. Taylor*. 1997. Glycerol elicits energy taxis in *Escherichia coli* and *Salmonella typhimurium*. *Journal of Bacteriology* 179:3196-3201.

16. Reinhold-Hurek*, B., and **I. B. Zhulin**. 1997. Terminal oxidases of *Azoarcus* sp. BH72, a strictly respiratory diazotroph. *FEBS Letters* 404:143-147.

15. Bespalov, V. A., **I. B. Zhulin***, and B. L. Taylor. 1996. Behavioral responses of *Escherichia coli* to changes in redox potential. *Proceedings of the National Academy of Sciences of the USA* 93:10084-10089.

14. **Zhulin, I. B.***, Bespalov, V. A., M. S. Johnson, and B. L. Taylor. 1996. Oxygen taxis and proton motive force in *Azospirillum brasilense*. *Journal of Bacteriology* 178:5199-5204.

- 53 citations

13. Wong, L. S., M. S. Johnson, **I. B. Zhulin**, and B. L. Taylor*. 1995. Role of methylation in *Bacillus subtilis* aerotaxis. *Journal of Bacteriology* 177: 3985-3991.

12. **Zhulin, I. B.**, A. F. Lois, and B. L. Taylor*. 1995. Behavior of *Rhizobium meliloti* in oxygen gradients. *FEBS Letters* 367: 180-182.

11. **Zhulin, I. B.**, L. E. Sarmiento, and B. L. Taylor*. 1995. Changes in membrane potential upon chemotactic stimulation of *Azospirillum brasilense*, p.299-305. In I. Fendrik, M. Del Gallo, J. Vanderleyden and M. de Zamaroczy (Ed.), *Azospirillum VI and Related Microorganisms: Genetics, Physiology, Ecology*. NATO ASI Series, Vol. G 37. Springer-Verlag, Berlin.

10. **Zhulin*, I. B.**, and B. L. Taylor. 1995. Chemotaxis in plant-associated bacteria: the search for the ecological niche, p.451-459. In I. Fendrik, M. Del Gallo, J. Vanderleyden and M. de Zamaroczy (Ed.), *Azospirillum VI and Related Microorganisms: Genetics, Physiology, Ecology*. NATO ASI Series, Vol. G 37. Springer-Verlag, Berlin.

9. **Zhulin, I. B.**, and J. P. Armitage*. 1993. Motility, chemokinesis, and methylation-independent chemotaxis in *Azospirillum brasilense*. *Journal of Bacteriology* 175: 952-958.

8. **Zhulin, I. B.***, and J. P. Armitage. 1992. The role of taxis in the ecology of *Azospirillum*. *Symbiosis* 13: 199-206.

7. Grishanin, R. N., I. I. Chalmina, and **I. B. Zhulin***. 1991. Behaviour of *Azospirillum brasilense* in a spatial gradient of oxygen and a "redox" gradient of an artificial electron acceptor. *Journal of General Microbiology* 137: 2781-2785.

6. **Zhulin, I. B.***, I. B. Gibel, and V. V. Ignatov. 1991. A rapid method for the measurement of bacterial chemotaxis. *Current Microbiology* 22: 307-309.

5. Shchyogolev*, S. Yu. and **I. B. Zhulin**. 1990. Effective method of cell agglutination analysis by lectins, p. 405-409. In J. Kocourek and D. L. J. Freed (Ed.), *Lectins - Biology, Biochemistry, Clinical Biochemistry*, Vol. 7, Sigma Chemical Co, St. Louis, Mo.

4. Binyukov*, V. I., **I. B. Zhulin**, T. P. Korotkova, I. N. Topchieva, V. V. Ignatov, A. B. Shapiro, and D. N. Ostrovsky. 1989. Interaction of *Azospirillum brasilense* cells with redox polymers. *Mikrobiologiya* 58: 43-48.

3. **Zhulin, I. B.***, S. E. Tretyakova, and V. V. Ignatov. 1988. Chemotaxis of *Azospirillum brasilense* towards compounds typical of plant roots exudates. *Folia Microbiologica* 33: 277-280.

2. **Zhulin, I. B.**, and V. V. Ignatov*. 1986. Chemotaxis of *Azospirillum brasilense* towards amino acids. *Mikrobiologiya* 55: 340-342.

1. **Zhulin, I. B.**, V. I. Panasenko, S. K. Stupnikova, and S. Yu. Shchyogolev*. 1984. Study of agglutination of microbes in suspension by a spectro-turbidimetric method. *Biofizika*, 29: 857-861.

*corresponding author

Research Grants and Contracts

Completed

“Signal Transduction in Bacteria”, co-investigator, National Institutes of Health R01 GM29481 (PI, B.L. Taylor), 10/1996-09/2000, \$1,218,000 total

“Behavioral Responses of *Azospirillum brasilense* Involved in Nitrogen Fixation”, sole PI, 96-35305-3795, US Department of Agriculture, 10/1996-10/1998, \$106,694 total (\$106,694 to me)

“Molecular Mechanism of Taxis in *Azospirillum brasilense*”, sole PI, 0315-8845-20, National Medical Technology Testbed, 2/1998-2/1999, \$9,650 total (\$9,650 to me)

"Motility Genes and their Products in a Bacterium with Mixed Flagellation" PI, with one Co-PI, LST.CLG 975040, North Atlantic Treaty Organization, 6/1999-7/2001, BEF 450,000 total (BEF 275,000 to me)

“Sensor Chemoreceptors in the Biofertilizer Organism”, PI, with one Co-PI, Global Partnerships Grant Award, Board of Regents of the University System of Georgia, 7/2002-6/2003, \$5,000 total (\$3,000 to me)

“Comparative and Functional Genomic Analyses of Hemicellulose Biosynthesis in Xylem Cells”, Co-PI, Institute of Paper Science and Technology seed grant (PI, G. Peter), 8/2002-7/2003 \$40,000 total (\$20,000 to me)

“Comparative Genomics of Signal Transduction in Prokaryotes”, sole PI, National Science Foundation, EIA-0219079, 9/2002-8/2003, \$142,000 total (\$142,000 to me)

“Genome Sequencing of Plant-Associated *Azospirillum brasilense*”, PI, with two Co-PIs, National Science Foundation, EF-0412186, 8/2004-7/2008, \$791,217 total (\$100,000 to me)

Ongoing

“Computational Genomics of Signal Transduction”, sole PI, National Institutes of Health, R01 GM072285, 9/2004-8/2009, \$1,253,670 total (\$1,253,670 to me)

“Integrated Genome-Based Studies of *Shewanella* Ecophysiology”, co-PI, US Department of Energy (James Fredrickson, PI), 12/2006-11/2009, \$13,500,000 total (\$700,000 to me)

“Improved Genetic Selection of Plant Growth Promoting Bacteria for Rice and Wheat”, co-PI, Australian Research Council (Ivan Kennedy, PI), 01/2007 – 12/2009, \$1,222,818 total (\$100,000 to me)

“The DOE Bioenergy Research Center”, Key Investigator, US Department of Energy (Martin Keller, PI), 10/2007- 8/2012, \$125,000,000 total (\$2,000,000 to me)

Student Awards

- 2003 NSF-IGERT 0221600 fellowship to Luke E. Ulrich
- 2004 Georgia Tech President’s Undergraduate Research award to Jason Reeves
- 2005 Georgia Tech College of Science Outstanding Graduate student award to Luke E. Ulrich
- 2005 Bob Macnab Award for the BLAST VIII Meeting Best Poster to Roger P. Alexander

Meetings and Symposia

a) Member of the Organizing Committee

- BLAST IX International Conference on Bacterial Locomotion and Signal Transduction (Laughlin, NV), Meeting Review Committee 2007
- 6th International conference on Bioinformatics “In Silico Biology” (Atlanta, GA) 2007
- 5th International conference on Bioinformatics “In Silico Biology” (Atlanta, GA) 2005
- 4th International conference on Bioinformatics “In Silico Biology” (Atlanta, GA) 2003
- 3^d International conference on Bioinformatics “In Silico Biology” (Atlanta, GA) 2001

b) Invited speaker

- Swiss Institute for Bioinformatics Annual “Scientific Days” (Fribourg, Switzerland) 2009
- Frontiers in Genomics, National Program (Cuernavaca, Mexico) 2008
- DOE Genomics:GTL meeting on *Shewanella* (Washington, D.C.) 2008

Gordon Research Conference on Sensory Transduction in Microorganisms (Ventura, CA)	2008
IEEE 7 th International Symposium on Bioinformatics & Bioengineering, (Cambridge, MA)	2007
11 th Evolutionary Biology Meeting (Marseilles, France)	2007
15 th International Congress on Nitrogen Fixation (Cape Town, South Africa)	2007
BLAST IX International Conference on Bacterial Locomotion and Signal Transduction (Laughlin, NV)	2007
<i>Plenary speaker</i> , Systems Biology & Bioinformatics Symposium of The Biomedical Engineering Society Annual Meeting BMES 2006 (Chicago, IL)	2006
Advanced Bacterial Genetics Course, Cold Spring Harbor Laboratory (Cold Spring Harbor, NY)	2006
105 th General meeting of the American Society for Microbiology (Orlando, FL)	2006
93d Boehringer-Ingelholm Fonds International Conference “Mechanisms of Chemotaxis” (Titisee, Germany)	2006
Gordon Research Conference on Sensory Transduction in Microorganisms (Ventura, CA)	2006
DOE Genomics:GTL meeting on <i>Geobacter</i> , University of Massachusetts (Amherst, MA)	2005
Joint meeting of the International Union of Microbiological Societies (San Francisco, CA)	2005
3d Annual Rutgers/Princeton BIOMAPS Summer School “Short Course on Signal Transduction” (Piscataway, NJ)	2005
104 th General meeting of the American Society for Microbiology (New Orleans, LA)	2004
Isle of Palms Bioinformatics Symposium (Charleston, SC)	2004
Gordon Research conference on Sensory Transduction in Microorganisms (Ventura, CA)	2004
7 th International meeting on Bacterial Locomotion and Signal Transduction (Cuernavaca, Mexico)	2003
University System of Georgia Annual Research Symposium “Applying Bioinformatics: From Genes to Systems” (Atlanta, GA)	2002
5 th European Conference on Nitrogen Fixation (Norwich, U.K.)	2002
3d International conference on Bioinformatics “In Silico Biology” (Atlanta, GA)	2001
13 th International Congress on Nitrogen Fixation (Hamilton, Canada)	2001
Oak Ridge Associated Universities Workshop on Genomics (Durham, NC)	2001
6 th International meeting on Bacterial Locomotion and Signal Transduction (Cuernavaca, Mexico)	2001
8 th International Symposium on Nitrogen Fixation (Sydney, Australia)	2001
Gordon Research Conference on Sensory Transduction in Microorganisms (Ventura, CA)	2000
6 th ASM Meeting "Small Genomes" (Arrowhead, CA)	1998
11 th International Congress on Nitrogen Fixation (Paris, France)	1997
NATO Advanced Research Workshop on Nitrogen Fixation (Poznan, Poland)	1996
3 th International meeting on Bacterial Locomotion and Signal Transduction (Cuernavaca, Mexico)	1995
NATO Advanced Research Workshop “ <i>Azospirillum VI</i> ” (Sarvar, Hungary)	1994
1 st European Nitrogen Fixation Conference (Szeged, Hungary)	1994

Invited seminars at other universities

Department of Microbiology, University of Iowa	2009
Department of Biostatistics, Bioinformatics & Epidemiology, Medical University of South Carolina	2009
Biozentrum, University of Basel, Switzerland	2009

Laboratory of Microbial Ecology, Clause Bernard University, Lyon, France	2009
Department of Microbiology, Georgetown University School of Medicine	2008
Department of Computer Science, University of North Carolina at Charlotte	2007
Department of Bioengineering and Bioinformatics, Moscow State University, Russia	2007
Department of Microbiology, University of Georgia	2007
Department of Biological Sciences, University of Idaho	2007
Department of Microbiology and Molecular Genetics, University of Texas, Houston	2007
Department of Biology, University of Arkansas	2006
DOE Joint Genome Institute	2006
Division of Biological Sciences, University of California at San Diego	2006
Pacific Northwest National Laboratory	2006
Department of Biology, Texas A&M University	2005
Center for Biomedical Sciences, University of Ulster, UK	2004
Department of Microbiology, University of Tennessee	2004
Computational Biology Institute, Oak Ridge National Laboratory	2004
Department of Microbiology, University of Massachusetts (Amherst)	2003
Laboratory of Microbial Ecology, Claude Bernard University, Lyon, France	2003
Institut Pasteur, Paris, France	2003
Institute for Plant-Microbe Interactions, CNRS-INRA, Castanet-Tolosan, France	2003
Center for Microbial and Plant Genomics, Katholieke Universiteit Leuven, Belgium	2002
Department of Microbiology, University of Hawaii	2002
Computational Biology Unit, Argonne National Laboratory, Department of Energy	2002
Department of Microbiology and Immunology, Emory University School of Medicine	2001
Center for Marine Biotechnology, Baltimore	2000
Integrated Genomics/University of Chicago	2000
Department of Cell Biology and Molecular Genetics, University of Maryland, College Park	2000
Department of Biology, University of California at San Diego	1999
National Institute for Agricultural Research, Dijon, France	1999
Laboratory of Microbial Ecology, Claude Bernard University, Lyon, France	1999
Department of Plant Pathology, University of California at Riverside	1998
National Center for Biotechnology Information, NIH, Bethesda	1998
Department of Biology, Moscow State University, Moscow, Russia	1997
Department of Plant Pathology, University of Arizona, Tucson	1996
F.A. Janssens Laboratory of Genetics, Katholieke Universiteit Leuven, Belgium	1996

Professional Committees

Committee on computing, Division of Biology, University of Tennessee	2008
JDRD Review Panel, Science Alliance	2007
Microbiology Graduate Curriculum Committee (UT)	2006-present
Governor's Chair in Biological Sciences Search Committee (UT-ORNL)	2006-present
Joint Institute for Biological Sciences Director Search Committee (UT-ORNL)	2006
Review Panel, Laboratory Directed Research & Development: Ultrascale Computing Initiative (ORNL)	2006
Center for Security of Agriculture and Environment (GT-UGA)	2002-2005
Endowed Chair in Bioinformatics search committee (GT)	2001-2002
Microbiology faculty search committee (GT)	2002-2003

Bioinformatics faculty search committee(GT)	2002-2004
Environmental Bioinformatics and Nanotechnology search committee (GT)	2004
Coordinator, Departmental Seminar Series (GT)	2002

PhD thesis committees

Cindy Korir (GT)	2000-2004
John Bessemer (GT)	2000-2001
Hope Howard-Jones (GT)	2001-2002
Rosa Krajmalnik-Brown (GT)	2002-2005
Lance Miller (GT)	2002-present
Jianzhong He (GT)	2002-2003
Bonnie Stephens (Georgia State University)	2002-2006
Yuan Tian (GT)	2003-2004
Vardges Ter-Hovanesyan (GT)	2003-2005
Arcady Furman (GT)	2003-2004
Natalia Shmeleva (GT)	2003-2005
Ryan Mills (GT)	2003-2005
Sharissa Hall (GT)	2004
Kristin Wuichet (GT)	2003-2007
Luke Ulrich (GT)	2003-2006
Roger Alexander (GT)	2004-2007
Janet Wilson (GT)	2004-2005
David McWilliams (GST UT-ORNL)	2005-2006
Ian Wallace (UT Biochemistry, Molecular & Cell Biology)	2005-present
Kortney Gustin (UT Microbiology)	2005-present
Harold Shanafield (GST UT-ORNL)	2006-2008
Justin Vaughn (GST UT-ORNL)	2006-present
Davi Ortega (UT Physics)	2006-present
Miriam Land (GST UT-ORNL)	2007-2008
Bhanu Rekapalli (UT Computer Engineering)	2007
Kirill Borziak (GST UT-ORNL)	2008-present

Undegraduate Students Supervised

Walter Ashford, Spring/Summer 2001	MD student at MCG
Laura Frick (HHMI intern), Spring/Summer/Fall/2001/Spring 2002	MD student at Emory
Andrea Liatis, Summer 2001	PhD student, at Emory
Joshua Mauldin, Summer/2001	technician at CDC
Chengyi Shu (HHMI intern), Summer/Fall 2001/Spring 2002	PhD student at UCLA
Siddharth Joshi, Summer/Fall 2001	MS student at GT
Mohammad Massoomi, Fall 2001	
Deena Walsh, Fall 2001/Spring 2002	
Madhumitha Rajagopal, Fall 2001/Spring/Summer 2002	PhD student at UC Davis
Amy Alexcovich, Spring/Fall 2002	dentistry student at MCG
Alice Metzger, Spring 2002	dentistry student at MCG
Chinequa Patterson (HHMI intern), Summer/Fall 2002	PhD student at Wayne State
Neha Verma, Fall 2002/Spring/Summer/Fall 2003	

Justin Wilkin, Fall 2002
Jason Reeves (Presidential Undergraduate Research Assistant (PURA) award), Spring/Summer 2004
Thomas Filip (GT College of Computing), Spring/Summer/Fall 2005
Kirill Borziak, 2005
Tatiana Perevozchikova, 2006-2007

PhD student at UTK
PhD student at UTK

Graduate Students Supervised

Ruslan Grishanin (Ph.D. 1996), Postdoctoral fellow at the Department of Physiology, University of California, San Francisco
Vyacheslav A. Beshpalov (Ph.D. 1999), Postdoctoral fellow at the School of Molecular Biosciences, Washington State University (Pullman, WA)
Sean A. Bulloch (M.S., 1999), Bioinformatics scientist at Incyte Genomics (Palo Alto, CA)
Enid McKinley (M.S., 2001), PhD student at the Department of Infectious Diseases, University of Georgia (Athens, GA)
Suzanne E. Greer (Ph.D. 2003), Postdoctoral fellow at the University of California (Riverside, CA)
Omar Alexander (M.S., 2003), MD student at Medical College of Georgia (Augusta, GA)
William Black (M.S., 2004), MD student at the University of Mississippi Medical Center (Jackson, MS)
Siddharth Joshi (M.S., 2004), Lecturer, Georgia Military College (Atlanta, GA)
Luke Ulrich (Ph.D., 2006), Agile Genomics, LLC (Charleston, SC)
Kristin Wuichet (Ph.D., 2007)
Lance Miller (Ph.D., 2007), Postdoctoral Fellow, Oak Ridge National Laboratory (Oak Ridge, TN)
Roger Alexander (Ph.D., 2007), Postdoctoral Fellow, Department of Molecular, Cell & Developmental Biology, Yale University (New Haven, CT)
Bhanu Rekapalli (Ph.D. 2007), Research Associate, Oak Ridge Institute for Science and Education (Oak Ridge, TN)
Harold Shanafield (M.S., 2008), Research Specialist, Oak Ridge National Laboratory (Oak Ridge, TN)
Davi Ortega (Ph.D., current 2st year)
Miriam Land (M.S., 2008), Staff Scientist, Oak Ridge National Laboratory (Oak Ridge, TN)
Kirill Borziak (Ph.D, current 1st year)

Graduate Students in the GT Professional MS in Bioinformatics Program Supervised

Luke Ulrich, Spring/Summer/Fall 2002.
Nalini Lanka, Summer/Fall 2002.
Nicolae Dimitriu, Summer/Fall 2002.
Jasmin Alcantar, Fall 2002.
Santosh Muruganantham, Fall 2002.
Mili Shah, Fall 2002/Spring 2003.
Mary Rosen, Fall 2002.
Anushka Nethisinghe, Fall 2003/Spring/Summer 2004
Charley Brown, Spring/Summer 2004
Jessica Shah, Spring 2004
Shalini Pradhan, Spring 2004
Chaitanya Muralidhara, Spring 2004

Prashant Kelli, Fall 2004
Oluwabukunmi Ayanbule, Fall 2004/Spring/Summer 2005

Postdoctoral Fellows Supervised

Subrata K. Das (1997-1998), Assistant Professor, Institute of Life Sciences (Bhubaneswar, India)
Gladys Alexandre (1998-2001), Associate Professor, University of Tennessee (Knoxville).
Christophe Mougél (2000-2001), Assistant Professor (Charge de recherché), INRA-CMSE (Dijon, France)
Luke Ulrich (2006-2007), Founder and CEO, Agile Genomics, LLC (Charleston, SC)
Brian Cantwell (2006-present)
Bhanu Rekapalli (2007-present)
Leonid Sukharnikov (2009-present)

Visiting Students

Sam Braiman (undergraduate student, Columbia University)	2008 (three months)
Nick Braiman (undergraduate student, Columbia University)	2008 (three months)
Masaru Kojima (PhD student, Nagoya University, Japan)	2006 (three months)
Daisuke Shiomi (PhD student, Nagoya University, Japan)	2000 (three months)
Dieter Hauwaerts (PhD student, KU Leuven, Belgium)	1998 (two months)

Visiting Scientists

Dr. Ariane Briegel (Postdoctoral Associate, California Institute of Technology) – 1 week in 2008
Prof. Ivan Kennedy (Director, Centre for Nitrogen Fixation, The University of Sydney, Australia) – 3 months in 2008
Dr. Laurent Philippot (Group leader, INRA, Dijon, France) – 6 months in 2004

Outreach

2009 Supervisor for Katherine Xie and Albortz Bejnood (Oak Ridge High School), winners of the team competition, Appalachian Science Fair
2008 Supervisor for Katherine Xie and Albortz Bejnood (Oak Ridge High School), finalists of the regional (Southwest) Siemens Science competition
2008 Lecturer, Science AP class, Farragut High School (Knoxville, TN)
2007 Keynote speaker, Tennessee Junior Sciences and Humanities Symposium (Knoxville, TN)
2007 Award presenter, Tennessee Science Olympiad State Competition (Knoxville, TN)
2007 Host for Dr. Anouk Schneider (France) at the request of Knoxville Rotary Club (Knoxville, TN)
2007 Lecturer, Mathematics class, Oak Ridge High School (Oak Ridge, TN)
2007 Lecturer, Pre-Game Faculty Showcase, University of Tennessee Football (Knoxville, TN)