

Curriculum Vitae Catherine Leigh Higgins

Contact Information

Work

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Date and Place of Birth

February 21, 1977
Richmond, Virginia

Family

Married

Current Employment

Program Director, Research Consortia, Gulf Coast Consortia, Interdisciplinary Bioscience Research and Training, September 2007 to present

Education

- 1995 Valedictorian, Northside High School and Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia. Cumulative GPA 4.2, Advanced Studies Diploma, Governor's Seal, and Exceptional Attendance Seal.
- 1995-1999 **B.S.** Chemistry, music minor, The College of William and Mary, Williamsburg, Virginia. Mentor: David E. Kranbuehl, Ph.D. (dekran@wm.edu) – polymer science (<http://www.as.wm.edu/Faculty/Kranbuehl/dek01.htm>). **Research topic: Examination of Accelerated Aging of Nylon-11 Polymer.** Cumulative GPA 3.2. Personally financed undergraduate education.
- 2000 Social Foundations of Education, University of Virginia, Graduate Center, Roanoke, Virginia. Towards completion of Virginia Teaching Certificate requirements.
- 2000-2004 **Ph.D.** Chemistry, Tulane University, New Orleans, Louisiana. Mentor: Pernilla Wittung-Stafshede, Ph.D. (pernilla@rice.edu) – protein folding and stability (<http://www.bioc.rice.edu/pernilla/index.htm>). Completed courses: Introduction to Biochemistry, Intermediate Biochemistry, Inorganic Structure and Bonding, Advanced Organic - General Principles, Organometallic Chemistry of Transition Elements, Structure and Function of Biomolecules, Polymer Organic Chemistry, Independent Studies – Thermostable Proteins, Seminars. Prospectus defense November 8, 2002. Admitted to Doctoral Candidacy September 11, 2003. **Dissertation title: "Unfolding and Stability Properties of [2Fe-2S] Ferredoxins from the Hyperthermophilic Bacterium Aquifex aeolicus."** Passed dissertation defense March 12, 2004. Degree conferred May 22, 2004. Cumulative GPA 3.8.
- 2004-2007 **NIH Postdoctoral Fellow**, Atherosclerosis and Vascular Biology Training Program (<http://www.bcm.edu/medicine/athero/traingrant.htm>), Baylor College of Medicine, Houston, TX. Mentors: Joel D. Morrisett, Ph.D. (morriset@bcm.tmc.edu) and Henry J. Pownall, Ph.D. (pownall@bcm.tmc.edu). **Research topics: Mechanism(s) of vascular calcification, involvement of matrix metalloproteinases in atherosclerosis, and stability of high-density lipoproteins.**

Honors and Fellowships

- 2000-2004 Louisiana Board of Regents Research Fellowship
2002 American Chemical Society Women Chemists Committee Travel Award
2003 Who's Who Among Students in American Universities and Colleges
2004 Who's Who Among Students in American Universities and Colleges
2004 NIH Postdoctoral Fellowship, Baylor College of Medicine Atherosclerosis and Vascular Biology Training Program
2004 Poster Young Investigator Award, XV International Symposium on Drugs Affecting Lipid Metabolism
2005 Prize-Winning Poster, House Staff Symposia, Department of Medicine, Baylor College of Medicine
2005-2007 Science Education Leadership Fellow, Howard Hughes Medical Institute, Baylor College of Medicine
2006 Cover feature article, *Arteriosclerosis, Thrombosis, and Vascular Biology*, October issue
2007 Cover feature article, *FEBS Journal*, August issue

Academic Appointments

- 1999-2000 General and Advanced Chemistry Teacher, Jefferson Forest High School, Forest, VA
2000-2004 Research Fellow, Chemistry Department, Tulane University, New Orleans, LA
2004-present NIH Postdoctoral Fellow, Atherosclerosis and Vascular Biology Training Program, Department of Medicine, Baylor College of Medicine, Houston, TX

PUBLICATIONS

From Undergraduate Studies with Dr. David E. Kranbuehl

1. "Monitoring and modeling the durability of polymers used for composite offshore oil transport," Kranbuehl, D.; Hood, D.; Rogozinski, J.; Meyer, A.; Powell, E.; Higgins, C.; Davis, C.; Hoipkemeier, L.; Ambler, C.; Elko, C.; Olukcu, N. Recent Developments in Durability Analysis of Composite Systems, DURACOSYS 99, Proceedings of the International Conference on Durability Analysis of Composite Systems, 4th, Brussels, Belgium, July 11-14, 1999 (2000), 413-420.

From Graduate Studies with Dr. Pernilla Wittung-Stafshede

2. "A Hyperthermophilic Plant-Type [2Fe-2S] Ferredoxin from *Aquifex aeolicus* Is Stabilized by a Disulfide Bond," Jacques Meyer, Michael D. Clay, Michael K. Johnson, Audria Stubna, Eckard Münck, Catherine Higgins, and Pernilla Wittung-Stafshede, *Biochemistry* **2002** 41(9): 3096-3108.
3. "Exceptional Stability of a [2Fe-2S] Ferredoxin from Hyperthermophilic Bacterium *Aquifex aeolicus*," Catherine L. Higgins, Jacques Meyer, and Pernilla Wittung-Stafshede, *Biochimica et Biophysica Acta* **2002** 1599(1-2): 82-89.
4. "An Isc-type Extremely Thermostable [2Fe-2S] Ferredoxin from *Aquifex aeolicus*. Biochemical, Spectroscopic, and Unfolding Studies," Géraldine Mitou, Catherine Higgins, Pernilla Wittung-Stafshede, Richard C. Conover, Archer D. Smith, Michael K. Johnson, Jacques Gaillard, Audria Stubna, Eckard Münck, and Jacques Meyer, *Biochemistry* **2003** 42(5): 1354-1364.
5. "High thermal and chemical stability of *Thermus thermophilus* seven-iron ferredoxin: linear clusters form at high pH upon polypeptide unfolding, " Susanne Griffin, Catherine L. Higgins, Tewfik Soulimane, and Pernilla Wittung-Stafshede, *European Journal of Biochemistry* **2003** 270:4736-4743.
6. "Formation mechanisms of linear three-iron clusters in *Aquifex aeolicus* two-iron ferredoxins depend on protein-unfolding speed," Catherine L. Higgins and Pernilla Wittung-Stafshede, *Archives of Biochemistry and Biophysics* **2004** 427(2): 154-63.

7. "How do cofactors modulate protein folding?" Catherine L. Higgins, B.K. Muralidhara, and Pernilla Wittung-Stafshede, *Protein and Peptide Letters* (Special Protein Folding Issue) **2005** 12:165-70.
8. "Thermodynamic Stability and Folding of Proteins from Hyperthermophilic Organisms," Kathryn Luke, Catherine L. Higgins, and Pernilla Wittung-Stafshede, *FEBS Journal* **2007** 274(16):4023-33. (Article featured on volume cover.)

From Postdoctoral Studies with Dr. Joel D. Morrisett and Dr. Henry J. Pownall

9. "Quantification of Arterial Calcification," Catherine L. Higgins, Seth Marvel, and Joel D. Morrisett, *Arteriosclerosis, Thrombosis, and Vascular Biology* **2005** 25(8): 1567-76.
10. "Quantitation and Localization of Matrix Metalloproteinases and Their Inhibitors in Human Carotid Endarterectomy Tissues," Salman Choudhary*, Catherine L. Higgins*, Iou Yih Chen, Michael J. Reardon, Gerald Lawrie, Wesley Vick, III, Christof Karmonik, David P. Via, and Joel D. Morrisett (*equal contributions) *Arteriosclerosis, Thrombosis, and Vascular Biology* **2006** 26(10): 2351-58. (Article featured on volume cover.)
11. "Speciation of human plasma high-density lipoprotein (HDL): HDL stability and apolipoprotein A-I partitioning," Henry J. Pownall, Brian D. Hosken, Baiba Gillard, Catherine L. Higgins, Alice Hu Yu Yang Lin, and John B. Massey *Biochemistry* **2007** 46(25):7449-59.
12. "Roles of Serum Receptor Activator of Nuclear Factor KappaB Ligand and Osteoprotegerin in Carotid Atherosclerosis and Osteoporosis," Salim Islibir*, Catherine L. Higgins₁*, Douglas Brownfield, Pamela Basto, Iou Yih Chen, Thomas Irving, Muthiah Vaduganathan, Periyanan Vaduganathan, Michael J. Reardon, Christof Karmonik, and Joel D. Morrisett (*equal contributions) **2007** in preparation.
13. "Characterization of Tissue Excised from Superficial Femoral Artery Atherosclerotic Lesions by SilverHawk Atherectomy," Kirt Martin, Catherine L. Higgins, Iou Yih Chen, Wei Zhou, and Joel D. Morrisett **2007** submitted.

ACTIVITIES AND SERVICE

Professional Societies

2000-2004	New Orleans Protein Folding Intergroup
2000	American Chemical Society
2002	Protein Society
2003	Omicron Delta Kappa: The National Leadership Honor Society
2003	Phi Lambda Upsilon
2003	Sigma Xi
2004	American Heart Association/American Stroke Association
2004	Federation of American Societies for Experimental Biology/American Society for Biochemistry and Molecular Biology
2006	Biophysical Society

National Service

Journal Reviewer (ad hoc reviewer): *Arteriosclerosis, Thrombosis, and Vascular Biology*

University Service

2000-2003	Tulane University Graduate School Student Association Representative
2000-2003	Tulane University Graduate and Professional Student Association Representative
2001	PITTCOON 2001 (New Orleans) Student Aide: Security
2002	PITTCOON 2002 (New Orleans) Student Aide: Program
2002-2003	Chemistry Department Graduate Student Association Treasurer

- 2003-2004 Omicron Delta Kappa Vice President of Membership
2003-2004 Tulane University Graduate and Professional Student Association Executive Vice President
2003-2004 Tulane University Chemistry Department Student Advisory Committee Chair
2003-2004 Tulane University Associated Student Body Restructuring Committee Chair
2003-2004 Tulane University Graduate and Professional Student Association Election and Recruitment Committee Chair
2003-2005 Omicron Delta Kappa Faculty Province Leader for Province XV
2003-2004 Tulane University Graduate Council
2006-2007 Baylor College of Medicine Postdoctoral Association Executive Committee Member

TEACHING

- 2000 Chemistry Magic Teacher, Roanoke County Public Schools Gifted and Talented Program, Roanoke, VA
2000-2001 Volunteer Teacher, "Look Out Einstein!" Orleans Parish After School Program, New Orleans, LA
2001 Volunteer Teacher, Chemistry Institute, Benjamin Franklin Elementary School, New Orleans, LA
2001-2003 Chemistry Tutor for 15 Tulane University undergraduate students and 10 area high school students, New Orleans, LA
2002 Teacher, "Protein Structure, Folding and Function" Tulane Student Scholars Program, New Orleans, LA
2002 Volunteer Teacher in Curriculum Development, Audubon English/ French School, New Orleans, LA
2003 Workshop Leader, "Empowering Leadership," Omicron Delta Kappa Province XV Conference, University of Houston, Houston, TX
2003 Teacher, "Protein: Past, Present, and Future" Tulane Student Scholars Program, New Orleans, LA
2005-2007 Science Education Leadership Fellows Program, Howard Hughes Medical Institute, Baylor College of Medicine, Houston, TX. Mentored two elementary school teachers in the lab: Susan Creager and Regina Williams
2006 Workshop Leader, "The Missing Protein," Sally Ride Science Festival, Rice University, Houston, TX
2007 Biosciences Inspiration and Opportunities for Students (BIOS) Program, National Science Foundation, Baylor College of Medicine, Houston, TX. Mentored two high school students in the lab: Cecilia Cai and Raeshma Rajesh

Course Participation

- 2001-2003 Proctor and grader for General Chemistry, Tulane University, New Orleans, LA.
2003 Guest lecturer for Pernilla Wittung-Stafshede (February 24, 26, 28), Physical Chemistry II (CHEM312), Chemistry Department, Tulane University, New Orleans, LA.
2006 Guest lecturer for Pernilla Wittung-Stafshede (October 30), Topics: Transport and Separation Techniques, Biochemistry and Cell Biology Department, Rice University, Houston, TX.

RESEARCH PRESENTATIONS

Invited Speaker

1. "Acetylcholinesterase: Developing its Inhibitors," Tulane University Chemistry Department Seminar Series, New Orleans, LA, January 2002.
2. "Exceptional Stability of [2Fe-2S] Ferredoxins from Hyperthermophilic Bacterium *Aquifex aeolicus*," New Orleans Protein Folding Intergroup, New Orleans, LA, July 18, 2002.
3. "Proteins Fold? A Triptych Study of Protein Folding and Ferredoxins," Roanoke Valley Governor's School for Science and Technology, Roanoke, VA, March 21, 2003.
"Unfolding and Stability Properties of [2Fe-2S] Ferredoxins from the Hyperthermophilic Bacterium *Aquifex aeolicus*"
4. National Institute of Standards and Technology, Gaithersburg, MD, October 30, 2003.
5. Princeton University, Princeton, NJ, November 1, 2003.
6. National Cancer Institute, Frederick, MD, December 20, 2003.
7. Baylor College of Medicine, Houston, TX, January 30, 2004.
8. University of Texas Medical Branch, Galveston, TX, February 8, 2004.
9. Mayo Clinic, Rochester, MN, February 13, 2004.
10. Tulane University Hayward Genetics Center, New Orleans, LA, March 9, 2004.
11. Rice University, Houston, TX, May 27, 2004.
12. "Roles of Osteocalcin, Matrix GLA Protein, and BMP-2 in Vascular Calcification," Atherosclerosis and Lipoprotein Research Section Journal Club, Baylor College of Medicine, Houston, TX, June 2, 2004.
13. "Endocrine Control of Calcium and Phosphate Homeostasis," Atherosclerosis and Lipoprotein Research Section Journal Club, Baylor College of Medicine, Houston, TX, December 15, 2004.
14. "Protein Culprits of Vascular Calcification," Atherosclerosis and Vascular Biology Training Program, Baylor College of Medicine, Houston, TX, December 16, 2004.
15. "Biochemistry of Vascular Calcification," Atherosclerosis and Vascular Biology Training Program, Baylor College of Medicine, Houston, TX, November 3, 2005.
16. "Smooth Muscle Cell Migration," Atherosclerosis and Lipoprotein Research Section Journal Club, Baylor College of Medicine, Houston, TX, November 30, 2005.
"A Scientist's Trek Through Academia: From Polymers and Proteins to Atherosclerosis"
17. Colby College, Waterville, ME, November 30, 2006.
18. Coker College, Hartsville, SC, December 7, 2006.
19. University of Wisconsin Oshkosh, Oshkosh, WI, December 11, 2006.
20. "SOAR: Science Outreach at Research Universities," University of Missouri-Columbia, Columbia, MO, December 14, 2006.
"Towards Elucidating the Mechanisms and Roles of Proteins in Atherosclerosis"
21. Virginia Polytechnic Institute and State University, Blacksburg, VA, December 21, 2006.
22. Baylor University, Waco, TX, January 8, 2007.

Abstracts

1. "High Stability for [2Fe-2S] Ferredoxin from Hyperthermophilic *Aquifex aeolicus* Bacterium," Tulane University Molecular and Cellular Biology Graduate Program Scientific Retreat, Gulf Park Conference Center, Long Beach, MS, October 27-28, 2001.
2. "High Stability for [2Fe-2S] Ferredoxin from Hyperthermophilic *Aquifex aeolicus* Bacterium," Experimental Biology 2002, Morial Convention Center, New Orleans, LA, April 19-24, 2002.
3. "Exceptional Stability of a [2Fe-2S] Ferredoxin from Hyperthermophilic Bacterium *Aquifex aeolicus*," 16th Symposium of the Protein Society, San Diego Marriott Hotel & Marina, San Diego, CA, August 17-21, 2002.

4. "Unfolding and Stability Properties of [2Fe-2S] Ferredoxins from the Hyperthermophilic Bacterium *Aquifex aeolicus*," The Seventh Johns Hopkins Folding Meeting, Coolfont Conference Center, Berkeley Springs, WV, March 22-25, 2003.
5. "Role of Osteopontin and Osteoprotegerin in Atherosclerotic Calcification and Osteoporosis," (Salim Isbilir, poster presenter), XV International Symposium on Drugs Affecting Lipid Metabolism, Venice Convention Center, Venice, Italy, October 24-27, 2004.
6. "Roles of Osteopontin, Osteoprotegerin, and RANKL in Calcification of Carotid Arteries and in Osteoporosis," The Cellular Biology of Atherosclerosis, Keystone Resort, Keystone, CO, January 22-27, 2005.
7. "Roles of Osteopontin, Osteoprotegerin, and RANKL in Calcification of Carotid Arteries and in Osteoporosis," House Staff Symposia, Department of Medicine, Baylor College of Medicine, Houston, TX, April 7, 2005.
8. "Interactions Among Matrix Metalloproteinases (MMPs), Tissue Inhibitors of Metalloproteinases (TIMPs), and Calcification Proteins in Carotid Endarterectomy (CEA) Lesions," 6th Annual Conference on Arteriosclerosis, Thrombosis, and Vascular Biology, Grand Hyatt Washington, Washington, DC, April 28-30, 2005.
9. "Roles of Osteopontin, Osteoprotegerin, and RANKL in Calcification of Carotid Arteries and in Osteoporosis," Baylor College of Medicine Department of Biochemistry and Molecular Biology Retreat, San Luis Resort, Galveston, TX, August 25-26, 2005.
10. "Matrix Metalloproteinases (MMPs), Tissue Inhibitors of MPs (TIMPs), and Calcification Proteins in Carotid Endarterectomy (CEA) Lesions," 15th Annual Research Conference, Keck Center for Interdisciplinary Bioscience Training and the John S. Dunn, Sr. Gulf Coast Consortium for Magnetic Resonance, University of Houston Hilton Hotel, Houston, TX, October 6-7, 2005.
11. "Matrix Metalloproteinases (MMPs), Tissue Inhibitors of MPs (TIMPs), and Calcification Proteins in Carotid Endarterectomy (CEA) Lesions," House Staff Symposia, Department of Medicine, Baylor College of Medicine, Houston, TX, April 6, 2006.
12. "Roles of Osteopontin, Osteoprotegerin, and Receptor Activator of Nuclear Factor κ B Ligand in Ectopic Calcification of Human Carotid Arterial Atherosclerotic Lesions and in Osteoporosis," 7th Annual Conference on Arteriosclerosis, Thrombosis, and Vascular Biology, Denver Marriott City Center, Denver, CO, April 27-29, 2006.
13. "Unmasking High-Density Lipoprotein Instability by Chaotropic and Detergent Perturbation," 51st Annual Meeting of the Biophysical Society, Baltimore, MD, March 3-7, 2007.

Scientific Techniques

Polymer science: laser light scattering (LS), gel permeation chromatography (GPC), materials testing system (MTS), differential scanning calorimetry (DSC), thermo gravimetric analysis (TGA), solution viscometry

Protein chemistry: absorption spectroscopy, fluorescence spectroscopy, circular dichroism (CD), DSC, electrophoresis, high performance liquid chromatography (HPLC), fast protein liquid chromatography (FPLC), enzyme-linked immunosorbent assay (ELISA), mass spectrometry, nuclear magnetic resonance (NMR), various molecular biology techniques

Computer Skills

Macintosh, Windows, Claris Works, Microsoft Word, Microsoft Excel, Microsoft Access, Microsoft Power Point, Corel Quattro Pro, Word Perfect, Kaleidagraph, Graph Pad Prism, Blackboard

High School Awards and Honors

- 1990-1995 Participant in All District Symphonic Bands
- 1993 Pearl S. Buck Award
- 1993 National Honor Society
- 1994 Summer Science Governor's School, The College of William and Mary, Williamsburg, VA
- 1995 First Chair Flutist, All District Symphonic Band
- 1995 Longwood Chapter Scholarship, American Business Women's Association
- 1995 Gay B. Shober Memorial Scholarship, Roanoke County School Employee's Federal Credit Union
- 1995 M. Freida Koontz Scholarship, Virginia Congress of Parents and Teachers
- 1995 Most Valuable Student Scholarship, Virginia Elks Association
- 1995 Bayes E. Wilson Scholarship, The Roanoke County Public Schools Education Foundation, Inc.
- 1995 The Andy Thompson Fund Scholarship, E. Price Ripley Memorial Foundation
- 1995 Northside High School Band Boosters Scholarship
- 1995 Most Outstanding Student in Advanced Grammar and Composition
- 1995 Most Outstanding Student in Advanced Placement English 12
- 1996 Longwood Chapter Scholarship, American Business Women's Association
- 1997 Longwood Chapter Scholarship, American Business Women's Association

Work Experience

- 07/2001-01/2002 Interim Director, Baptist Collegiate Ministry, New Orleans, LA
- 09/1999-06/2000 Chemistry Teacher, Jefferson Forest High School, Bedford County, VA
- 06/1999-08/1999 Inside Sales Account Manager, Overnite Transportation Company, Richmond, VA
- 03/1998-05/1999 Research Chemist, Kranbuehl Lab, The College of William and Mary, Williamsburg, VA
- 01/1999-05/1999 Florist Assistant, The Flower Cupboard, Williamsburg, VA
- 08/1997-05/1999 Music Library Assistant, The College of William and Mary, Williamsburg, VA
- 08/1996-05/1999 Secretary, Baptist Student Union, Williamsburg, VA
- 05/1997-09/1997 Children's Team Member, Roanoke Valley Baptist Association, Roanoke, VA
- 05/1996-05/1997 Sales Associate, Leggett, Valley View Mall, Roanoke, VA
- 05/1996-08/1996 Secretary, Mary Kay Team Leader, Roanoke, VA
- 05/1995-05/1996 Clerk, T-Shirt Plus, Valley View Mall, Roanoke, VA
- 11/1993-03/1994 Flutist, Cave Spring Baptist Church, Roanoke, VA
- 09/1990-03/2002 Babysitter, extensive child care for at least 10 families from middle school through graduate school