

Michelle E. McCully

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Daggett Group, University of Washington
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Education

Washington University in St. Louis 2002 – 2006
B.S. Biomedical Engineering
Minor, Computer Science

University of Washington, Seattle 2006 – current
Ph.D. Bioengineering
Interdisciplinary Program in Biomolecular Structure and Design

Research Experience

David Sept Lab, Undergraduate Research 2004 – 2006
Washington University, Department of Biomedical Engineering
Investigated the interactions between cytoskeletal proteins and various ligands using molecular dynamics and flexible ligand docking methods

David Baker Lab, Graduate Rotation Winter 2007
University of Washington, Department of Biochemistry
Worked towards computationally designing a novel retroaldolase using *Rosetta*

Ram Samudrala Lab, Graduate Rotation Spring 2007
University of Washington, Department of Microbiology
Used molecular dynamics and docking in order to predict binding affinities of HIV protease inhibitors

Valerie Daggett Lab, Graduate Research Fall 2006, Summer 2007 – current
University of Washington, Department of Bioengineering
Directly comparing the folding and unfolding pathways of an ultra-fast folding protein using molecular dynamics under a range of conditions; comparing the dynamics and folding pathways of natural vs. engineered proteins.

Teaching Experience

Freshman Engineering Seminar Fall 2003
Course Advisor, Washington University
Assisted in a weekly, student-run class taken by 200 freshmen engineers; oversaw a small group of students participate in design projects highlighting different engineering disciplines and acted as their peer advisor.

Introduction to Computer Science Fall 2004
Teaching Assistant, Washington University
Held weekly office hours to assist students one-on-one with lab work and assessed student performance in labs and on weekly written assignments

Biochemistry: Cellular and Molecular Biology Spring 2007
Teaching Assistant, University of Washington
Wrote questions for weekly quizzes based on lecture material; ran a quiz section which included discussion, problem solving, and quizzes

Introduction to Molecular Bioengineering Spring 2008
Teaching Assistant, University of Washington
Designed a three-week lab that introduced students to protein structure and dynamics to teach students how to use structural biology and bioinformatics tools, engineer a mutation in a protein of interest, run their own molecular dynamics simulations of their mutant, and analyze their mutant as compared to the wild type; wrote and graded weekly lab assignments and final lab report

Computational Protein Design Winter 2009
Teaching Assistant, University of Washington

Worked with instructor and another TA to design a curriculum and set of labs to teach students current techniques including molecular visualization, homology modeling, molecular dynamics, and computational protein design; provided technical assistance for weekly labs and advised students on their self-designed projects; researched and gave a lecture on computational vaccine design; continued to provide assistance to TAs and students in subsequent offerings of the course

Short Course on Computational Protein Design

November 2010

Teaching Assistant, Lund University, Sweden

Assisted Valerie Daggett, then a Visiting Professor at Lund University, in teaching ~12 students how to do homology modeling, protein design with *Rosetta*, and molecular dynamics; redesigned previous labs to conform to a new three-week curriculum; set up programs and facilitated running students' simulations on the Lunarc cluster, part of the Swedish National Infrastructure for Computing (SNIC).

Honors and Fellowships

Mrs. Carl H. Nieman and Lowy Enterprises Engineering Scholarships	2002-2006
Dean's Honorary Scholarship	2002-2006
Howard Hughes Medical Institute Summer Undergraduate Research Fellowship	2004
NCAA Division III Track & Field All-American	2005
Magna Cum Laude	2006
National Science Foundation: Graduate Research Fellowship Program, Honorable Mention	2008
Department of Defense: Science, Mathematics, and Research for Transformation Defense Scholarship for Service Program, Finalist	2008
Department of Defense: National Defense Science and Engineering Graduate Fellowship	2008-2011

Professional Affiliations

Tau Beta Pi, Engineering Honor Society

Alpha Eta Mu Beta, Biomedical Engineering Honor Society

Presentations

HHMI REU Fellowship Symposium	September 11, 2004
McCully ME and Sept D. PI(4,5)P ₂ Binding to Actin Regulating Proteins	
19th Gibbs Conference on Biothermodynamics	October 15-18, 2005
McCully ME and Sept D. Predicting the Binding Location of Phospholipids on Capping Protein	
45th Annual Meeting of the American Society for Cell Biology	December 10-14, 2005
McCully ME and Sept D. Binding of PI(4,5)P ₂ to Capping Protein	
Gordon Research Conference on Protein Folding Dynamics	January 9-15, 2010
McCully ME, Beck DAC, Fersht AR, and Daggett V. Direct Observation of Protein Folding at Atomic Resolution	

Publications

Kim K,* **McCully ME**,* Bhattacharya N, Butler B, Sept D, Cooper JA. Structure/function analysis of the interaction of phosphatidylinositol 4,5-bisphosphate with actin-capping protein: implications for how capping protein binds the actin filament. *J Biol Chem.* 282(8): 5871-9, 2007.

McCully ME, Beck DAC, Daggett V. Microscopic reversibility of protein folding in molecular dynamics simulations of the engrailed homeodomain. *Biochemistry.* 47(27): 7079-7089, 2008.

Bean GJ, Flickinger ST, Westler W, **McCully ME**, Sept D, Weibel DB, Amann KJ. A22 disrupts the bacterial actin cytoskeleton by directly binding and inducing a low-affinity state in MreB. *Biochemistry.* 48(22): 4852-7, 2009.

McCully ME, Beck DAC, Fersht AR, Daggett V. Refolding the Engrailed Homeodomain: Structural Basis for the Accumulation of a Folding Intermediate. *Biophys J.* 99(5): 1628-1636, 2010.

Morrone A, **McCully ME**, Bryan PN, Brunori M, Daggett V, Gianni S, Travaglini-Allocatelli C. The denatured state dictates the topology of two proteins with almost identical sequence but different native structure and function. *J Biol Chem.* 286(5):3863-3872, 2011.

Beck DAC, **McCully ME**, Alonso DOV, Daggett V. (2000-2012) *in lucem* Molecular Mechanics (*ilmm*), University of Washington, Seattle.

McCully ME and Daggett V. Folding and Dynamics of Engineered Proteins. In *Protein Engineering Handbook, vol. III*. Eds. Lutz S and Bornscheuer UT. Wiley-VCH, Weinheim. *Accepted*.

McCully ME, Beck DAC, Daggett V. Promiscuous contacts and heightened dynamics increase thermostability in two engineered proteins. *Submitted*.

McCully ME, Beck DAC, Daggett V. Test tube simulations: effects of intermolecular interactions on the folding pathway of the Engrailed Homeodomain. *In preparation for a special issue of PNAS, due March 2012*.

Wang D, Robertson I, Li M, **McCully ME**, Crane ML, Luo Z, Tu AY, Daggett V, Sykes B, Regnier M. Structural and functional consequences of the cardiac troponin C L48Q Ca²⁺-sensitizing mutation. *In Preparation*.

*Authors contributed equally to this work

Skills

Languages: Java, C++, C, perl, SQL

Applications: *in lucem* molecular mechanics, GROMACS, NAMD, VMD, Chimera, AutoDock, Condor, Adobe Photoshop, Adobe Illustrator, Microsoft Office

Platforms: Windows, Unix

Web Development: HTML, CSS, PHP

System Administration: Managed 100 TB of data and ~20 user accounts over ~8 RHEL servers using NFS and NIS

Updated: 1/24/2012