Leighann Sullivan, Ph.D.

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EDUCATION

Ph.D.	**Rice University, Houston, TX** Biochemistry and Cell Biology Department Advisor: George N. Bennett, Ph.D. Thesis: Molecular and Genomic Analyses in *Clostridium acetobutylicum*	May 2009
B.S.	**Cornell University, Ithaca, NY** Biology; concentration in Genetics Dean's List.	May 1998
	University of New South Wales, Australia Study Abroad Program	Fall 1997

RESEARCH EXPERIENCE

Doctoral Research

Biochemistry and Cell Biology Department, Rice University 2001-2009

- Characterized two novel proteins of *C. acetobutylicum* using molecular biology and protein expression techniques
- Evaluated isozyme mutants in *C. acetobutylicum* using site-directed mutagenesis, enzyme activity assays, and structural modeling
- Elucidated the effect of a transcription factor on the proteomes of multiple strains of *C. acetobutylicum*
- This work resulted in three peer-reviewed journal publications and a book chapter
- For a list of specific laboratory techniques with which I have experience, see technical skills section at the end of cv

Undergraduate Research

Research Assistant in Genetics, Cornell University Spring 1997

- Determined the location of the P-element responsible for a maternal effect lethal mutant stock of *Drosophila melanogaster*

Research Assistant in Biochemistry, Cornell University Fall 1996

- Prepared lipid bilayers and measured electrical properties as a model for cell membrane transporters

Research Assistant in Biochemistry, Rensselaer Polytechnic Institute Summer 1996

- Used affinity chromatography and polyacrylamide gel electrophoresis methods to determine the minimum structural requirements for enzyme catalysis; conducted literature searches

Research Assistant in Epidemiology, Cornell Veterinary College 1995 - 1998

- Managed database on Equine Motor Neuron Disease; recorded basic soil characteristics containing suspected *Cryptosporidium* and *Giardia* pathogens; conducted literature searches

Research Assistant in Genetics, Clarkson University Summer 1991

- Participated in 6-week summer research program for high school students in a genetics laboratory using *Drosophila melanogaster* as the model system

HONORS, AWARDS, & PROFESSIONAL ASSOCIATIONS

Diversity and Inclusion Grant, Women in Bio	Fall 2021
Graduate Fellowship, Biochemistry & Cell Biology	2001-2009
Student Travel Award, American Society for Microbiology	May 2006
Merit Scholarship, Houston Livestock Show and Rodeo	Fall 2002
Honor Society, Phi Lambda Upsilon	Fall 2002
Mentoring Award, Student Council Advisor	Spring 2001
Academic Achievement Awards, Education Opportunity Program	1995-1998

PUBLICATIONS

Published in peer-reviewed journals/book

Sullivan L, Cates MS, Bennett GN (2010). Structural correlations of activity of *Clostridium acetobutylicum* ATCC 824 butyrate kinase isozymes. Enzyme and Microbial Technology 46 (2) 118-124.

Sullivan L, Scotcher MC, and Bennett GN (2008). Increased biofuel production by metabolic engineering of *Clostridium acetobutylicum.* Wall J, Harwood C, and Demain A (Eds). "Bioenergy." American Society for Microbiology Press. Washington DC. Chapter 28. 361-376.

Sullivan L, Paredes CJ, Papoutsakis ET, and Bennett GN (2007). Analysis of the clostridial hydrophobic with a conserved W family (ChW) of proteins unique to *Clostridium acetobutylicum* with emphasis on *chw14* and *chw16/17.* Enzyme and Microbial Technology 42 (1) 29-43.

Sullivan L and Bennett GN (2006). Proteome analysis and comparison of *Clostridium acetobutylicum* ATCC 824 and Spo0A strain variants. Journal of Industrial Microbiology and Biotechnology 33 (4) 298-308.

CONFERENCE PRESENTATIONS

Clostridium IX, Houston, TX, platform May 2006
Sullivan L, Scotcher MC, Zhao Y, Tyurin M, and Bennett GN. Genetic Technology in *Clostridium acetobutylicum*

Clostridium IX, Houston, TX, poster May 2006
Sullivan L and Bennett GN. The Clostridial Hydrophobic with a Conserved W Family (ChW) of Proteins Unique to *Clostridium acetobutylicum*: Comprehensive Sequence Analysis of All Members and Promoter Architecture and Expression Determination of the Genes of Two Members, *chw14* and *chw16*.

American Society for Microbiology, Orlando, FL, platform & poster May 2006
Sullivan L and Bennett GN. The Clostridial Hydrophobic with a Conserved W Family (ChW) of Proteins Unique to *Clostridium acetobutylicum*: Comprehensive Sequence Analysis of All Members and Promoter Architecture and Expression Determination of the Genes of Two Members, *chw14* and *chw16*.

Lost Pines Molecular Biology, Smithville, TX, platform October 2005
Sullivan L and Bennett GN. The clostridial hydrophobic with a conserved W family (ChW) of proteins unique to *Clostridium acetobutylicum*: analysis of promoter architecture and expression of two of its members, *chw14* and *chw16*

Texas Branch American Society for Microbiology, Houston, TX, poster November 2004
Sullivan L and Bennett GN. The expression and regulation of ChW 14 and 16: possible players in the solvent transition in *Clostridium acetobutylicum.*

American Society for Microbiology, Washington, D.C., poster May 2003
Sullivan L and Bennett GN. Spo0A Regulates Global Gene Expression in *Clostridium acetobutylicum.*

TEACHING EXPERIENCE

College Level

Adjunct Instructor Massasoit Community College 2016 - present
Brockton, MA

Courses: General Chemistry I (science majors), Survey of Chemistry (science non-majors), Microbiology (science majors), Environmental Biology (early college), Nutrition (science non-majors), Human Genetics (science majors), Biological Principles I (science majors).

Responsibilities: Develop and deliver lectures incorporating active-learning strategies; facilitate and grade weekly laboratories, create and grade assessments (quizzes/ exams), moderate discussion boards
Student Populations: early college, both majors and non-majors, diverse socioeconomic and racial backgrounds, community college
Format: in-person, online since March 2020

Adjunct Instructor Curry College 2011 - 2013
Milton, MA

Courses: Microbiology, General Chemistry
Responsibilities: Facilitated laboratory sections, prepared reagents and supplies, graded weekly laboratory reports, created and graded quizzes and laboratory practical
Student Populations: majors, undergraduates, learning disabilities

Co-Instructor Rice University Fall 2008
Houston, TX

Course: Metabolic Engineering for Global Health Environments
Responsibilities: Co-designed the curriculum and co-taught this novel first run course, created and delivered lectures, evaluated weekly student presentations, wrote and graded midterm exam, guided students in end-of-term paper and presentation preparation, evaluated end-of-term paper and presentations.
Student Populations: majors, undergraduates

Guest lecturer Rice University Spring & Fall 2005
Houston, TX

Course: Introductory Biology
Responsibilities: Created and delivered 4 lectures, homework exercises, exam questions, and graded exams on the topic of Forensics (Spring 2005) and Microbiology (Fall 2005). For the Forensics section, additionally developed class discussion questions and guided small group and whole class discussion for 25 undergraduates. For the Microbiology section, additionally designed pre-lab questions and an experiential lab module for 50 undergraduates.
Student Populations: non-majors, undergraduates

Teaching Assistant Rice University 2002 - 2003
Houston, TX

Courses: Biochemistry I and II
Responsibilities: Conducted weekly review sessions, graded problem sets, and graded exams for class of 150.
Student Populations: majors, undergraduates

Teaching Assistant Cornell University Spring 1998
Ithaca, NY

Courses: Biology
Responsibilities: Conducted laboratory sessions, tutored, created, and administered oral and written tests for class of 200. Graded lab reports and exams.
Student Populations: majors, undergraduates

Discussion leader Rice University Fall 2006
Houston, TX

Courses: Microbiology and Biotechnology
Responsibilities: For 3 class periods, facilitated the discussion of 4 groups in specialized topic areas with approximately 7 students in each group.
Student Populations: majors, undergraduates

Research Mentor Rice University 2002 - 2008
Houston, TX

Courses: Independent Laboratory Research
Responsibilities: Taught 6 undergraduate students laboratory procedures and use of equipment in an independent research projects. Designed experiments and helped them troubleshoot. Guided them in their platform and poster presentations as well as written laboratory report at the end of each semester.
Student Populations: majors, undergraduates

K-12 level

Science Instructor Science from Scientists (NPO) 2013 - 2021
Bedford, MA
Classes: Wide breadth of science topics delivered by non-profit organization
Responsibilities: Co-teach twice monthly; provide highly interactive hands-on activities; mentor new instructors
Student Populations: middle school (4^{th}-8^{th} grade)

Tutor Houston, TX 2001 - 2004
Responsibilities: Individually tutor in Algebra, Geometry, Biology, and Chemistry.
Student Populations: 5 high school students

Tutor Alternative Learning Center Spring 1997
Ithaca, NY
Responsibilities: Individually tutor in Algebra and Geometry.
Student Populations: middle school, non-traditional school

Tutor Amenia, NY 2001
Responsibilities: Individually tutor in Spanish
Student Populations: Dyslexic high school senior

Teacher & The Kildonan School 1998 - 2001

Supervisor Amenia, NY
Classes: math, science, language training, skiing, study-hall
Responsibilities: Prepared and delivered lessons, created and graded tests, assignments, and study guides. Wrote extensive individualized reports. Maintained and ordered laboratory supplies. Customized multisensory lessons and individually tutored using the Orton Gillingham method. Provided individualized language training assistance during study halls. Taught basic skiing skills and chaperoned ski trips.
Student populations: middle and high school (7^{th}-12^{th} grade), learning disabled (dyslexic and attention-deficit), boarding school

PROFESSIONAL SERVICE

Committee Member Massasoit Community College Spring 2021
Brockton, MA

- An incipient committee of Justice, Equity, Diversity, and Inclusion
- Goal is to close equity gaps for underserved and at-risk students in STEM program

Grant Writing Massasoit Community College June 2020
Brockton, MA

- Comprehensive Local Needs Assessment for Perkins V
- Primary author for grant application for career and technical education programs' financial support

Curriculum Design Science from Scientists
Bedford, MA

- Developed an electrophoresis lesson and tested with commercially available materials for 4^{th}-8^{th} grade students — January 2015
- Developed a technology-free binary code lesson for 4^{th}-8^{th} grade students — August 2015

Poster Judge Rice University 2003-2006
Houston, TX

- Yearly undergraduate Research Symposiums
- Assessed the scientific and communication aspects of 6 undergraduate research posters during each poster session.

GSA Vice President for Internal Affairs Rice University 2001 - 2002
Houston, TX

- Participated in weekly graduate student association officer meetings and monthly general representative meetings. Coordinated the Awards ceremony for the Graduate Student Association, GSA, including the call for nominations, creation of selection committee, running selection committee meeting to decide awards, notification of administration and award recipients, advertising in school papers, ordering and presenting the awards. Sold advertisements for and edited the GSA directory.

Student Council Advisor The Kildonan School, Amenia, NY 1999 - 2001

- Designed meeting procedures and held weekly meetings, budgeted money, delegated responsibilities, guided the writing of student proposals, worked registration booths, sponsored weekly fund raisers, coordinated other activities to enhance the campus life of the students (e.g., dances and tournaments of pool and ping pong).

TECHNICAL SKILLS

Computational Analysis
Phylogeny generation (neighbor-joining method with CLUSTALX alignment)
Protein secondary structure prediction (Multivariate Linear Regression Combination)
RNA secondary structure prediction (Vienna RNA Secondary Structure Prediction)
Repetitive sequences analysis (Antheprot using dot plots)

Molecular Biology
Cloning (plasmid and genomic DNA isolation, Polymerase Chain Reaction, restriction digests, ligation, transformation, and screening)
Agarose gel electrophoresis

Protein Analysis
Recombinant protein expression
Chromatography (affinity and gel filtration) purification
Proteomic analysis
Enzyme assay (butyrate kinase)
Polyacrylamide gel electrophoresis
Enzyme-Linked Immunosorbent Assay (ELISA)
Western blot

Promoter Characterization
RNA isolation
Primer extension
Sequencing gel electrophoresis
Colorimetric reporter assays (β-galactosidase)
Radiolabeling

Metabolic Engineering
Fermentation (batch and controlled-pH)
Gas chromatography

Microbiology
Microbiological media preparation
Aerobic growth and maintenance of stocks (*E. coli*) including flash freezing
Anaerobic growth and maintenance of stocks (*C. acetobutylicum*) including lyophilization
Sonication
Centrifugation