

**Marc A. Benson**

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**Education****Doctor of Philosophy**

2003 - 2009

Department of Microbiology and Molecular Genetics

Medical College of Wisconsin, Milwaukee, WI

Dissertation: "Understanding the Mechanisms Mediating the Activation of the  
*Pseudomonas aeruginosa* Toxins ExoU and ExoY by their Cognate  
Activators"

**Bachelor of Science**

1996 - 2000

University of Puget Sound, Tacoma, WA

Major: Biology

**Employment History**

Assistant Professor of Microbiology

2012 - 2014

Department of Biological Sciences

Idaho State University

Pocatello, ID

Courses: BIOL4444/5544: Cell and Molecular Biology

BIOL4461: Advanced Genetics

BIOL6695: Graduate Seminar on Pathogenesis/Microbiology

Visiting Assistant Professor

2011 -2012

Department of Biology

Truman State University, Kirksville, MO

Courses: BIOL304: General Microbiology

CHEM435: Biochemistry II: Metabolism

BIOL545: Senior Seminar on Bacterial Toxins

**Postdoctoral Training****Postdoctoral Fellow**

2010 - 2012

Department of Molecular Microbiology and Immunology

University of Missouri School of Medicine, Columbia, MO

Subject: Characterization of the Botulinum neurotoxin host-cell receptor interaction to  
develop specific anti-toxins and/or improved clinical therapeutics

**Mentoring/Training****Idaho State University:**

Michael Madrid (Graduate Student)

Defended M.S. Thesis 2014

Cassie Bell (Graduate Student)

Defending Thesis 2015

ChaoFang Tan (Graduate Student)

2013-2014

Undergraduate Students (5)

2012-2014

**Truman State University:**

Undergraduate Students (6)

2011-2012

## Publications

Benson MA, Peterson T, Salazar L, Morris W, Howlett B, and Phelps P. **Burnout in rural physician assistants: an initial study.** Submitted for Review. 2015

Tan CF, Madrid M, Haldorson M, Benson MA. **Role of Cysteine Residues on the Stability and Activity of the *Pseudomonas aeruginosa* Type Three Secreted Effector, ExoY.** In Progress.

Benson MA, Fu Z, Kim J, and Baldwin MR. **Unique Ganglioside Recognition Strategies for Botulinum Neurotoxin Type E and Type F.** J Biol. Chem. 2011 Sep 30;286(39)

Benson MA, Komar SM, Schmalzer KM, Casey MS, Frank DW, and Feix JB. **Induced conformational changes in the activation of the *Pseudomonas aeruginosa* type III toxin, ExoU.** Biophys J. 2011 Mar;100(5)

Schmalzer KM, Benson MA, and Frank DW. **Activation of ExoU Phospholipase Activity Requires Specific C-terminal Regions.** J Bacteriol. 2010 Apr;192(7)

Benson M, Schmalzer KM, and Frank DW. **A Sensitive Fluorescence-Based Assay for the Detection of Intracellular ExoU-mediated PLA<sub>2</sub> activity.** Clin Chim Acta. 2010 Feb;411(3-4)

## Invited Speaker

A.T. Still University, Department of Microbiology and Immunology (2011). **Botulinum and Tetanus Neurotoxins: Could Pathology be Related to Unique Ganglioside Recognition?**

Truman State University, βββ Biological Honor Society (2011). **Botulinum and Tetanus Neurotoxins: Unique Ganglioside Recognition**

American Society for Microbiology - Missouri Branch (2011). **Unique Ganglioside Recognition Strategies for Botulinum Neurotoxin Type E and Type F**

## Research Grants

Idaho State University (\$20,000). **Mechanistic Study Characterizing Clostridial Neurotoxin Entry for the Purpose of Drug Design.** (2014) Principal Investigator

VSL Pharma (\$3,574). **Probiotics as an Adjuvant in Enhancing the Health Benefits of a Polyphenol-Rich Diet.** (2013) Co-investigator

NASA-Missouri Space Grant Consortium (\$20,000). **Characterizing the Effects of Early-Earth Stressors on Anoxygenic Phototrophs.** (2011) Co-investigator

## Service

Institutional Biosafety Committee – 2013 - 2014. Committee Member

INBRE Selection Committee. Spring 2013. Committee Member

TRiO Meet A Scientist Luncheon. March 19, 2013

CommUniversity Biology Representative. March 19, 2013

Biology Website Committee. Spring 2013 - 2014 Committee Member

**Poster Presentations**

Thibeault C and Benson MA. **Eukaryotic Host Factors and Tetanus Toxin Translocation.** ISU Research Day (2014)

Madrid M, Tan C, Haldorson M and Benson MA. **Characterization of ExoY Activity, a Type Three Secreted Exoenzyme from *Pseudomonas aeruginosa*.** Idaho Conference on Undergraduate Research (2014)

Tan C and Benson MA. **Type Three Secretion Studies using the *Pseudomonas aeruginosa* Adenyl Cyclase Effector, ExoY.** 12<sup>th</sup> Annual INBRE Conference (2013)

Olson BW, Morris D, Clay C, and Benson MA. **Lifestyle Influence on the Bacterial Flora of the Oropharynx.** 25th Annual Truman State University Student Research Conference (2012)

Abram B and Benson MA. **Prevalence of Methicillin-Resistant *Staphylococcus aureus* in Truman State University Football Helmets.** 25th Annual Truman State University Student Research Conference (2012)

Shimotani D, Young M, and Benson MA. **The Effects of Ultraviolet Radiation on the Photosynthetic Behavior of *C. aurantiacus*.** 25th Annual Truman State University Student Research Conference (2012)

Benson MA, Fu Z, Barbieri JT, Kim J and Baldwin MR. **Unique Ganglioside Recognition Strategies for Clostridial Neurotoxins.** 10<sup>th</sup> Annual Great Plains Infectious Disease (2011)

Benson MA, Fu Z, Barbieri JT, Kim J, and Baldwin MR. **Ganglioside Recognition by Botulinum Neurotoxin Serotypes E and F.** 17<sup>th</sup> Annual Midwest Microbial Pathogenesis Conference (2010)

Benson MA, Fu Z, Barbieri JT, Kim J, and Baldwin MR. **Structural Basis of Ganglioside Recognition by Botulinum Neurotoxin Serotypes F.** Gordon Research Conference: Microbial Toxins and Pathogenesis (2010)

Benson MA, Fu Z, Barbieri JT, Kim J, and Baldwin MR. **Structural Basis of Ganglioside Recognition by Botulinum Neurotoxin Serotypes F.** Gordon Research Seminar: Molecular Mechanisms in Pathogenesis and Host-Microbe Interactions (2010)

Benson MA, Fu Z, Barbieri JT, Kim J, and Baldwin MR. **Structural Basis of Ganglioside Recognition by Botulinum Neurotoxin Serotype F.** 9<sup>th</sup> Annual Great Plains Infectious Disease (2010)

Benson MA, Schmalzer K, and Frank DW. **In Vitro Characterization of the Activation of the *Pseudomonas aeruginosa* ExoU Cytotoxin by Superoxide Dismutase 1.** 109<sup>th</sup> ASM General Meeting (2009)

Schmalzer K, Benson MA, Frank DW. **Characterization of the Protein-Protein Interactions that Mediate Phospholipase Activity of ExoU, a *Pseudomonas aeruginosa* Cytotoxin.** 109<sup>th</sup> ASM General Meeting (2009)

Benson M. **Understanding the Mechanisms Mediating the Activation of ExoU by Superoxide Dismutase.** Departmental Oral Presentation (2009)

Benson MA, Schmalzer K, and Frank DW. **Activation of the *Pseudomonas aeruginosa* Cytotoxin, ExoU, by Superoxide Dismutase.** 15<sup>th</sup> Annual Midwest Microbial Pathogenesis Conference (2008)

Schmalzer K, Benson MA, Frank DW. **Characterization of the Structural and Functional Regions of ExoU.** 15<sup>th</sup> Annual Midwest Microbial Pathogenesis Conference (2008)

Benson MA. **Search for the Eukaryotic Activator for ExoY, an Adenylyl Cyclase Effector.** Departmental Oral Presentation (2007)

Benson MA and Frank DW. **Identification of the Cellular Cofactor for ExoY, an Adenylyl Cyclase Toxin Secreted by the *Pseudomonas aeruginosa* Type Three Secretion System.** 4<sup>th</sup> International Symposium on Virulence Mechanisms of Bacterial Pathogens (2006)

Benson MA. **The Adenylyl Cyclase ExoY and Search for its Cofactor.** Departmental Oral Presentation (2006)

Benson MA, Lohr N, and Frank DW. **Identification of Proteins that Interact with *Pseudomonas aeruginosa* Adenylyl Cyclase Toxin, ExoY.** 12<sup>th</sup> Annual Midwest Microbial Pathogenesis Conference (2005)

### Professional Affiliations

American Society for Microbiology (ASM)

American Association for the Advancement of Science (AAAS)

### Awards/Honors

Competitively selected (ISU) to attend the NIH Regional Seminar: Program Funding and Grants Administration (2013)

Outstanding Dissertation Award Recipient. Medical College of Wisconsin (2010)

Graduate Student Travel Award. 109<sup>th</sup> ASM General Meeting (2009)

Graduate Student Travel Award. 4<sup>th</sup> International Symposium on Virulence Mechanisms of Bacterial Pathogens (2006)

### Additional Training

Rapid Annotation using Subsystem Technology (RAST) Workshop. Argonne National Laboratory (2008)

Biosafety Level (BSL2) experience (2003 - Current); BSL3 approved