

**BIOMEDICAL & VETERINARY SCIENCES
GRADUATE PROGRAM**



ANNOUNCES

The Doctor of Philosophy Seminar
and Examination of

Lauren Marie Sheehan

**“Characterizing the AbcR/VtIR system
in the *Rhizobiales*”**

Friday, April 20, 2018

1:00 pm

VMCVM Classroom 100



Bio

Lauren Sheehan grew up in the small town of Ringwood, New Jersey and attended high school at DePaul Catholic. In 2009, she graduated and moved to Blacksburg Virginia to pursue a degree in Animal Science. After graduating with her Animal & Poultry Science Bachelor's degree in 2013, she joined Dr. Clayton Caswell's lab to begin her Ph.D in microbiology. Her research primary focused on identifying and characterizing genetic systems in the mammalian pathogen *Brucella* that are utilized by the microbe to cause infection. Later research expanded into understanding the conservation and importance of these genetic system in closely related organisms such as the plant-associated bacteria *Agrobacterium* and *Sinorhizobium*. Following her defense, Lauren is moving to Irvine, California to start a postdoctoral position in Dr. Ming Tan's lab, and her research will focus on *Chlamydia* cell biology and pathogenesis.

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Lay Language Abstract

Understanding the genetic systems utilized by microbes to cause infection is key for developing therapeutics that can be administered to fight against them. Moreover, identifying and characterizing these essential microbial systems can be exploited for the development of drugs to target and shut down these systems, thus causing cell death. The present work took a basic molecular biology approach and characterized a highly conserved genetic system, named the AbcR/VtIR system, in two pathogenic bacteria: the plant pathogen *Agrobacterium* and the mammalian pathogen *Brucella*. Overall, the work described here shows this system to be an important component in acquiring nutrients for the microbe, and, most importantly, found the VtIR/AbcR system to be essential for host-microbial interactions.

Publications

Budnick, J.M., **Sheehan, L.M.**, Kang, L., Michalak, P., and Caswell, C.C. (2018) 'Characterization of three small proteins in *Brucella abortus* linked to fucose utilization'. *J. Bacteriol* Accepted with minor revisions.

Budnick, J.M., **Sheehan, L.M.**, Colquhoun, J.M., Dunman, P.M., Walker, G.C., Roop, R.M. II., and Caswell, C.C. (2018) 'The endoribonuclease YbeY is linked to proper cellular morphology and virulence in *Brucella abortus*'. *J Bacteriol* Accepted.

Sheehan, L.M. and Caswell, C.C. (2017) 'An account of evolutionary specialization: the AbcR small RNAs in the *Rhizobiales*'. *Mol Microbiol* doi: 10.1111/mmi.13869.

Caudill, M.T., Budnick, J.A., **Sheehan, L.M.**, Lehman, C.R., Purwantini, E., Mukhopadhyay, B., Caswell, C.C. (2017) 'The proline utilization system is required for infection by the pathogenic Alphaproteobacterium *Brucella abortus*'. *Microbiology* **163**:970-979.

Sheehan, L.M. and Caswell, C.C. (2017) 'A 6-nucleotide regulatory motif within the AbcR-small RNAs of *Brucella abortus* mediates host-pathogen interactions'. *mBio* **8**. e00473-17.

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M., and Caswell, C.C. (2015) 'A LysR-family transcriptional regulator required for virulence in *Brucella abortus* is highly conserved among the Alphaproteobacteria'. *Mol Microbiol* **98**:318-328.

Sheehan, L.M.*, Budnick, J.A.* , Roop, R.M. II., and Caswell, C.C.

(2015) 'Coordinated zinc homeostasis is essential for the wild-type virulence of *Brucella abortus*'. *J Bacteriol* **197**:1582-1591.

*Denotes first authors

Presentations

Sheehan, L.M. and Caswell, C.C. 'Regulating regulators: the role of RNase E in the degradation of sRNAs'. Brucellosis Conference, December 2-3, 2017. Chicago, IL. [†]

Sheehan, L.M., Fyffe-Blair, J. and Caswell, C.C. 'The bacterial pac-man: a story of an essential ribonuclease in the pathogenic bacterium *Brucella*'. Wind River Conference on Prokaryotic Biology, June 14-18, 2017. Estes Park, CO. [†]

Sheehan, L.M. and Caswell, C.C. 'A six-nucleotide regulatory motif in the *Brucella abortus* AbcR sRNAs mediates host-bacterium interactions'. The Mid-Atlantic Microbial Pathogenesis Meeting, February 12-14, 2017. Wintergreen, VA. [†]

Sheehan, L.M. and Caswell, C.C. 'Characterizing the molecular mechanisms of sRNA-mediated regulation in *Brucella abortus*'. Virginia Branch American Society of Microbiology Meeting, November 4-5, 2016. Roanoke, VA. [†]

Sheehan, L.M. and Caswell, C.C. 'Characterizing the molecular mechanisms of sRNA-mediated regulation in *Brucella abortus*'. Regulatory & Non-Coding RNAs Meeting, August 23-27, 2016. Cold Spring Harbor, NY.

Sheehan, L.M. and Caswell, C.C. 'How does *Brucella* de-stress? Hints about the putative role VtIR plays in intracellular survival'. Brucellosis Conference, December 5-6, 2015. Chicago, IL. [†]

Sheehan, L.M. and Caswell, C.C. 'A *Brucella abortus* regulator, VtIR, and its role in intracellular survival'. Virginia Branch American Society of Microbiology Meeting, November 6-7, 2015. Richmond, VA. [†]

Sheehan, L.M. and Caswell, C.C. 'VtIR: A LysR regulator that helps *Brucella* deal with a stressful situation'. Wind River Conference on Prokaryotic Biology, June 10-14, 2015. Estes Park, CO. [†]

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'A LysR-type transcriptional regulatory, VtIR, activates

putative small proteins and is critical to the survival of *Brucella abortus* 2308'. Virginia Tech Microbiology Symposium, March 7, 2015. Blacksburg, VA.

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'A highly conserved transcriptional regulator is essential for the pathogenesis of *Brucella abortus*'. The Mid-Atlantic Microbial Pathogenesis Meeting, January 25-27, 2015. Wintergreen, VA. †

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'A highly conserved LysR-type transcriptional regulator in Alphaproteobacteria plays an important role in the virulence of *Brucella abortus*'. Virginia Branch American Society of Microbiology Meeting, November 7-8, 2014. Harrisonburg, VA. †

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'Defining the role of a LysR-type transcriptional regulator in the virulence and pathogenesis of *Brucella abortus* 2308'. International Brucellosis Conference, September 9-12, 2014. Berlin, Germany. †

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'A LysR-type transcriptional regulator activates small proteins and plays a critical role in virulence of *Brucella abortus*'. Wind River Conference on Prokaryotic Biology, June 4-8, 2014. Estes Park, CO. †

Sheehan, L.M., Budnick, J.A., Blanchard, C., Dunman, P.M. and Caswell, C.C. 'A LysR-family regulator activates transcription of sRNA-encoding genes and plays a critical role in virulence of *Brucella abortus* 2308'. Brucellosis Conference, December 7-8, 2013. Chicago, IL. †

† Denotes oral presentation.

Awards and Academic Achievements

Virginia Tech Graduate Student Association Symposium, 2nd Place Oral Presentation. March 29, 2017. Blacksburg, VA.

Virginia Branch American Society of Microbiology Meeting, 3rd Place Oral Presentation. November 4-5, 2016. Roanoke, VA.

Outstanding Doctoral Student of the College of Veterinary Medicine at Virginia Tech. March 24, 2016. Blacksburg, VA.

Virginia Branch American Society of Microbiology Meeting, 1st Place Oral Presentation. November 6-7, 2015. Richmond, VA.

Virginia Tech Microbiology Symposium, 2nd Place Poster Presentation. March 7, 2015. Blacksburg, VA.

Virginia Tech Graduate Student Association Symposium, 1st Place Oral Presentation. March 25, 2014. Blacksburg, VA.

Virginia Tech Graduate Student Association, Research Development Program Recipient. December 18, 2014. Blacksburg, VA.

Virginia Tech Graduate Student Association Symposium, 2nd Place Oral Presentation, March 26, 2014. Blacksburg, VA.

Examination Graduate Committee

Major Advisors/Co-Chairs:

Clayton C. Caswell, Ph.D
Assistant Professor
Department of Biomedical Sciences & Pathobiology

Graduate Advising Committee Members:

Birgit Scharf, Ph.D
Associate Professor
Department of Biological Sciences

Nammalwar Sriranganathan, BVSc, MVSc, Ph.D, Diplomate, ACVM
Professor
Department of Biomedical Sciences & Pathobiology

Thomas J. Inzana, MS, Ph.D, Diplomate, ABMM
Professor
Department of Biomedical Sciences & Pathobiology

External Examiner

Renee Tsolis, PhD
Professor

Department of Medical Microbiology & Immunology
University of California Davis, School of Medicine



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