

**BIOMEDICAL & VETERINARY SCIENCES  
GRADUATE PROGRAM**



**ANNOUNCES**

The Master of Science Seminar and Examination of

**John Sanders**

**“The anthelmintic effect of *Bacillus thuringiensis* Cry5B  
on *Haemonchus contortus* in sheep”**

**Thursday, May 28th, 2020  
10:00 AM  
Zoom**



## **Bio**



John grew up in Northern Virginia and attended the Virginia Military Institute where he obtained his Bachelor of Science degree in Biology in 2018. He began his research career during undergraduate where he worked with Dr. Ashleigh Smythe, identifying nematodes on debris from Japan caused by the 2011 Tohoku tsunami. John was accepted by the College of Veterinary Medicine at Lincoln Memorial University and will be attending this Fall.

### **Funded by**

United States Department of Agriculture-NIFA  
VMCVM Office of Research and Graduate Studies

## Lay Language Abstract

Many animals and humans can be infected with roundworm, also called nematode, parasites. Infection of animals and humans by parasitic nematodes can result in disease. Some animals like ruminants (cows, sheep, and goats) can be infected with multiple species at once with few effects on the host. However, certain species can cause major disease, and even kill their ruminant host. Younger animals like lambs can easily become overwhelmed by these parasites. Anthelmintics are the type of drug used to treat those infected with these parasitic worms. However, just like bacteria are becoming resistant to antibiotics, these worms are also becoming resistant to anthelmintics. Because of this, researchers are looking for new compounds and materials that are lethal to the parasite and can be used to treat infected animals. One species of bacterium, *Bacillus thuringiensis*, is usually found in the soil. This bacterium can produce a large crystal structure that is made up of proteins. These crystal (Cry) proteins can be lethal to pest insects like beetles, caterpillars, and mosquitos. When the insect eats the protein, it binds to cells in the insect intestine, creating holes in the insect gut. These proteins can be lethal to nematodes as well when they are eaten by the worms. Because of this, these proteins are being investigated as potential alternative treatments for parasitic nematodes. One type of protein, Cry5B, has been tested in hamsters, mice, and pigs. We hypothesized that Cry5B would also be effective against a sheep stomach worm called *Haemonchus contortus*. We tested the Cry5B in two different formulations and found that the protein was effective against both the adult worm in the stomach, and the young worms in the feces of the host. This protein could potentially be used to treat parasitic nematodes that have become resistant to anthelmintics one day.

## **Presentations**

Effect of Bacillus thuringiensis Cry5B Protein on Haemonchus contortus in Experimentally Infected Sheep-27th Conference of the World Association for the Advancement of Veterinary Parasitology 2019

Effect of Bacillus thuringiensis Cry5B protein on Haemonchus contortus in Experimentally Infected Sheep- 721st meeting of the Helminthological Society of Washington 2019

## **Awards and Academic Achievements**

Winner of Stirewalt-Lincicome Student Award, 2019

## **Examination Graduate Committee**

### **Major Advisor/Chair:**

Anne Zajac, DVM, MS, PhD  
Professor, Parasitology  
Biomedical Sciences & Pathobiology

### **Graduate Advising Committee Members:**

David Lindsay, PhD  
Professor, Parasitology  
Biomedical Sciences & Pathobiology

Clayton Caswell, PhD  
Associate Professor, Bacteriology  
Biomedical Sciences & Pathobiology



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