

Application for 2008-2009 TWRI Mills Scholarship

1) Student Details:

Name of Student: Bailey A. Sullivan

2) Contact Information:

3) Advisor Contact Information:

Dr. Karthikeyan
Department of Biological and Agricultural Engineering
201 Scoates Hall
Texas A&M University
College Station, Texas 77843-2117
E-mail: karthi@tamu.edu
Phone No: (979)845-7951 (Office)

4) Research Proposal:

The U.S. produces 50 million pounds of antibiotics a year and half of them are used in agriculture. Currently antibiotics are used to treat diseases of both humans and animals as well as to promote growth in animals. Studies have shown that up to 75% of antibiotics that are ingested are excreted as waste products. These waste products can then be exposed to bacteria in streams, lagoons, or wastewater treatment facilities and the bacteria can develop resistance to antibiotics (Chopra and Roberts, 2001). This would be detrimental to both human and animal health.

The tentative title of my research project is “Antibiotic Resistance Reservoirs and Transfer Mechanisms in Natural and Engineered Aquatic Systems”.

The overall objective of my research is to study the development of resistance in soil and aquatic microorganisms to Tetracyclines. I will focus on Tetracyclines since they are commonly used to treat both human and animal illness, and they are frequently used to promote growth in animal feeding operations. The specific objectives of this study are to: (1) Evaluate the occurrence of antibiotic resistance in several land use regimes, including: rural, urban, and other areas with concentrated agriculture and animal operations, (2) Examine the effects of point sources such as wastewater treatment facilities and animal waste lagoons on antibiotic resistance development in waterbodies, and (3) Study how antibiotic resistance is transmitted between microorganisms in waterbodies.

This research will focus on bacteria associated with both water and soil under varying environmental conditions such as pH, temperature, oxygen, nutrients, and UV exposure. I will not be focusing on a single species of bacteria; instead, I hope to capture part of the diversity of the bacteria in these environments and compare how antibiotic resistance develops throughout the microbial community. It is important to understand the diversity of microbial systems and how they interact to develop antibiotic resistance. After a thorough understanding of how human activities influence antibiotic resistance, best management

practices can be developed to minimize or prevent antibiotic resistance development in Texas and the United States.

5) Proposed use of funds:

The funds from the scholarship will be used to attend American Society for Microbiology (ASM) National Conference to present my research results and major findings. This will also help me to know the ongoing research in antibiotic resistance bacteria in waterbodies.

6) Intended Career Path:

After receiving my Ph. D. from Texas A&M University, I will continue to conduct research in the area of environmental microbiology and water quality. My long-term goal is to obtain a faculty position at a university to pass on the knowledge that I have learned to others.

References:

Chopra, I. and M. Roberts. 2001. Tetracycline Antibiotics: Mode of Action, Applications, Molecular Biology, and Epidemiology of Bacterial Resistance. *Microbiology and Molecular Biology Reviews*. 65:232-260.