

ONTARIO VETERINARY COLLEGE
Project Proposal Form:
Summer Research Assistantship



ONTARIO
VETERINARY COLLEGE

1. BASIC INFORMATION

Advisor Name: Nicole Ricker

Department: Pathobiology

Proposed Start Date: 2019-05-06

CONTACT INFORMATION FOR STUDENT APPLICATIONS

Name: Nicole Ricker

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2. DETAILS OF PROJECT

Title of Proposed Project:

Role of the tonsil microbiome in Streptococcus suis disease in pigs

Outline of Proposed Research Project (please keep concise, approximately ½ page or less):

Streptococcus suis-related diseases are among the most common infectious problems on Ontario swine farms, resulting in decreased performance, increased drug use, nursery mortality, and welfare concerns. *S. suis* is a common bacterial inhabitant of the tonsils and nasal cavities of healthy pigs. Factors that contribute to transitioning of individual animals from carrying this organism to the state of systemic infection with severe clinical manifestations could be related to the *Streptococcus suis* itself, the host (e.g. genetics, microbiome, etc.), or the environment (e.g. stocking density, temperature, antibiotic usage, etc.).

This project will support and extend an on-going Food from Thought funded study examining the role of host, pathogen and environmental factors on *S. suis* disease development. Preliminary results based on 16S rRNA amplicon sequencing revealed a significant shift in microbial composition in confirmed systemic *S. suis* cases compared with healthy controls that is not observed in animals showing clinical signs that tested negative for systemic *S. suis*; however, this analysis can only provide the identity of the bacteria present and provides limited information on the functional changes that have occurred within the microbiome that correlate with disease development. Shotgun metagenomics is a method of sequencing all of the genes within the microbiome in order to better understand the functional capacity of the organisms present. Decreasing sequencing costs make this approach feasible for many sample types; however, contamination with host DNA makes this problematic in host-associated tissues such as the tonsil. This summer student project will evaluate the ratio of host DNA to bacterial DNA in tonsil homogenate samples from the *S. suis* study using qPCR and evaluate methods for removing host DNA prior to sequencing. A pilot sequencing run of 2 samples with deep sequencing coverage (60 Gb per sample) will also be performed to evaluate the feasibility of performing shotgun metagenomics on tonsil microbiome samples. The student will learn DNA extraction techniques, primer design, qPCR analysis and other laboratory techniques. If desired, the student can also gain an introduction to the field of bioinformatics and metagenome assembly.

3. AVAILABLE ASSISTANTSHIPS

Select assistantship most relevant to the proposed research project (multiple boxes may be checked).
Please note restrictions.

- Andrea Leger Dunbar Summer Research Assistantship:**
No restrictions

- James and Marjorie Pinkney Research Scholarship:**
Projects in *animal health and welfare*, restricted to veterinary students

- OVC Summer Research Studentship:**
Restricted to veterinary students

- Boehringer Ingelheim (previously Merial) Veterinary Scholars Program:**
Projects in *veterinary medicine*, restricted to veterinary students