

University of Alabama in Huntsville

LOUIS

RCEU Project Proposals

Faculty Scholarship

1-1-2020

Functional Characterization of Commensal Lactobacilli from Human Urinary Bladder

Tanya Sysoeva

University of Alabama in Huntsville

Follow this and additional works at: <https://louis.uah.edu/rceu-proposals>

Recommended Citation

Sysoeva, Tanya, "Functional Characterization of Commensal Lactobacilli from Human Urinary Bladder" (2020). *RCEU Project Proposals*. 109.

<https://louis.uah.edu/rceu-proposals/109>

This Proposal is brought to you for free and open access by the Faculty Scholarship at LOUIS. It has been accepted for inclusion in RCEU Project Proposals by an authorized administrator of LOUIS.

Project Title– Functional characterization of commensal *Lactobacilli* from human urinary bladder

Faculty - Tatyana (Tanya) Sysoeva, Assistant Professor, Department of Biological Sciences, Shelby Center room 369M, University of Alabama in Huntsville, 256-824-6371, tatyana.sysoeva@uah.edu

Proposal Identifier – RCEU20-BYS-TS-01

Project Description - Lactobacilli are known commensals in the urogenital tract and the medical and research communities have long perceived that lactobacilli are important for prevention of urinary tract infections (UTIs). Lactobacilli have innate defense factors that enable them to antagonize other bacteria, including uropathogenic *E. coli* through production of bacteriocin toxins. In an earlier project we isolated a set of 29 commensal lactobacillus species from the human urinary bladder and performed whole genome sequencing on 3 of those isolates. Preliminary analysis of the sequenced lactobacilli genomes shows presence of several bacteriocin genes and thus suggest that these commensal strains might show strong negative interference against other bacterial species. Therefore, the goal of this project is to screen the collection of the commensal lactobacilli for their interference against each other and uropathogenic *E. coli*. For that we will use a combination of bioinformatic analyses and microbiological techniques such as anaerobic growth and plate agar overlay technique. This screen for bacterial interference will identify which species and strains of urinary commensal lactobacilli affect each other and/or directly disrupt uropathogen growth. The lactobacilli strains that perform best in the interference assays will be tested further to understand involvement of bacteriocin in observed growth inhibition.

Student Duties, Tangible Contributions, and Specific Outcomes - This project will require full time presence in the lab for 32-40 hours per week, for 10-12 weeks. During this time the student will learn basic microbiological procedures and initial bioinformatic skills. In particular, this project will entail preparing solutions and plates; working with *Escherichia coli* and *Lactobacillus spp* bacteria; agar overlay assay; liquid and anaerobic culture. In addition to practical work, the researcher will read the peer-reviewed scientific articles that is required for understanding and developing of the project at hand. The student will also learn how to document the experimental work and keep laboratory notebook with the detailed description of the performed experiments. The student will be encouraged to prepare a poster for consecutive presentation at a scientific conference. At the end, the student researcher will be required to write a report with suggestions for future development of the project and analyses of the obtained results that can be used in a future publication. This report will be presented at a lab meeting to share the results and experiences with the whole group.

Student Selection Criteria - The student (from freshman to senior) should have completed some basic biology courses at UAH or as an AP course. While a good academic standing is not a requirement, the applicant has to have a sincere interest in the topic of microbiology in general or understanding the implication of microbiome on human health in particular.

Faculty Requirements and Mentorship -

Dr. Sysoeva will provide one-on-one meetings to introduce to the project, supervise literature review, discussions and analyses of the experimental results. In addition, weekly group meetings will be held to share the results and solve any ongoing issues. She will ensure close daily supervision and training in the laboratory setting for the hands-on work at the bench, including safety training and microbiological work. Dr. Sysoeva will guide the student researcher in writing up the report of the obtained results and preparing for the final presentation.

In addition, four MS students and an experienced undergraduate researcher working on related projects will be conducting their research in the laboratory and assist with microbiological work, such as media preparation, autoclaving, inoculations. Two of the MS students have experience teaching microbiology. It is particularly important that one of the MS students has recently completed the summer RCEU project and thus is familiar with the program goals and requirements. The undergraduate researcher is working with uropathogenic *E. coli* and thus will have first-hand experience in setting up most of the experiments for this project.