



**COLLEGE of
BIOLOGICAL SCIENCE**

DEPARTMENT OF MOLECULAR
AND CELLULAR BIOLOGY

Announcement:

All interested members of the university community are invited to attend the Final Oral Examination for the degree of **Master of Science** of

JINAL MANEK

On Monday, June 19, 2023 at 1:30 p.m. (online)

Thesis Title: **Characterizing the role of PA3923 and its homolog PA3422 in *P. aeruginosa* adhesion, biofilm formation and antibiotic resistance**

Examination Committee:

Dr. Jaideep Mathur, Dept. of Molecular and Cellular Biology (Exam Chair)

Dr. Cezar Khursigara, Dept. of Molecular and Cellular Biology

Dr. Georgina Cox, Dept. of Molecular and Cellular Biology

Dr. Rebecca Shapiro, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Cezar Khursigara (Advisor)

Dr. Georgina Cox

Abstract: *Pseudomonas aeruginosa* is a Gram-negative bacterium that is of huge concern to individuals with cystic fibrosis. *P. aeruginosa* can form biofilms which provides protection against harsh environmental conditions, host factors, and antibiotics. Previously, a proteomic analysis reported PA3923 to be highly abundant in PAO1 biofilm samples and was later stated to be able to bind to laminin. The goal of this study was to determine the role of PA3923, and its homolog PA3422, in their ability to function as adhesins, form biofilms, and resist antibiotics. Gene expression studies and phenotypic assays were conducted using PAO1 wildtype and PAO1 $\Delta pa3923$, PAO1 $\Delta pa3422$, and PAO1 $\Delta pa3422\Delta pa3923$ knockout strains. No change in growth, morphology, biofilm formation, or antibiotic resistance in planktonic and biofilm stages was concluded. However, gene expression levels of *pa3923* were always upregulated in the biofilm stage of PAO1 and PAO1 $\Delta pa3422$, however, the expression of *pa3422* significantly increased in the biofilm stage due to the absence of its homolog (PAO1 $\Delta pa3923$). With an inconclusive function, bioinformatic studies suggested these proteins may function as porins, possibly responsible for transporting components used for biofilm formation or maintenance. In summary, this work narrows the possible function of the two proteins and can be used as a foundation for characterizing various other putative proteins in the future.

Curriculum Vitae: Jinal completed her Bachelor of Science (Hons.) in Microbiology (Co-op) at the University of Guelph in April 2021. She began her Master of Science program in Molecular and Cellular Biology in Dr. Khursigara's lab in May 2021.

Awards: BIPOC Entrance Scholarship (2021); Carl Rom Colthoff Experiential Learning Award (2022).