UNIVERSITY of GUELPH

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*

NEETHU SHAJI SAJI

On Monday, September 16th, 2024 at 1:30 p.m. (SSC 2315)

Thesis Title: **Investigating the Oligomeric State of *Escherichia coli* Cell Division Protein, FtsK using Size Exclusion Chromatography and Native Gel Electrophoresis**

Examination Committee:

Dr. Nina Jones, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Cezar Khursigara, Dept. of Molecular and Cellular Biology
Dr. Siavash Vahidi, Dept. of Molecular and Cellular Biology
Dr. Emma Allen-Vercoe, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Cezar Khursigara (Advisor)
Dr. Matthew Kimber
Dr. Siavash Vahidi

Abstract: *Escherichia coli* is a model organism used to study cell division in gram-negative bacteria. The divisome is a multiprotein complex formed at the future division site in *Escherichia coli*. FtsK is one of the proteins essential for divisome formation. The N terminus of FtsK ($FtsK_N$) is the only protein region necessary for cell division. Despite the importance of the $FtsK_N$ in cell division, its structure and function still need to be fully understood. Recent studies propose that two amino acids, L32 and C169, may aid $FtsK_N$ oligomerization. In this thesis, I used native gel electrophoresis and size exclusion chromatography to explore the role of L32 and C169 in $FtsK_N$ oligomerization. When the L32F mutation is introduced, the $FtsK_N$ oligomers become more stable than the wild type. The oligomer stability is restored to the wild type when C169F is introduced along with the first mutation. The results obtained in this study, along with model predictions from AlphaFold 3, provide some evidence of the involvement of L32 and C169 in $FtsK_N$ oligomerization. The result from my thesis adds to the much-needed knowledge about the $FtsK_N$ and the working of divisome in general.

Curriculum Vitae: Neethu completed her B.Sc. (Hons.) in Biomedical Science with a minor in Psychology at the University of Waterloo in 2017. She then completed her Master of Biotechnology in Fall 2019 at the University of Guelph. She began her M.Sc in Molecular and Cellular Biology in Summer 2020 under the supervision of Dr. Cezar Khursigara.

Awards: Graduate Tuition Scholarship (2020 - 2024)

Publications: Anderson, E. M., Shaji Saji, N., Anderson, A. C., Brewer, D., Clarke, A. J., & Khursigara, C. M. (2022). *Pseudomonas aeruginosa* alters peptidoglycan composition under nutrient conditions resembling cystic fibrosis lung infections. *mSystems*, 7(3). https://doi.org/10.1128/msystems.00156-22