



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

RILEY ELDER

On Friday, May 6, 2022 at 1:30 p.m. (online)

Thesis Title: Azoreduction: Reductive metabolism of azo food dyes by species of the human gut microbiome

Examination Committee:

Dr. Ray Lu, Dept. of Molecular and Cellular Biology (Exam Chair)
Dr. Emma Allen-Vercoe, Dept. of Molecular and Cellular Biology
Dr. Jennifer Geddes-McAlister, Dept. of Molecular and Cellular Biology
Dr. Stephen Seah, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Emma Allen-Vercoe (Co-Advisor)
Dr. David Josephy (Co-Advisor)
Dr. Jennifer Geddes-McAlister

Abstract: Azo dye food colourants are widely used in Canada and other countries. When ingested, these dyes may be reduced by azoreductases of the gut microbiome bacteria to metabolites that might have immune-, neuro-, or genotoxic effects. I have identified obligate anaerobic bacterial species from the human gut that reduce these azo food dyes. Bacterial species (representing six phyla) derived from fecal microbiomes were obtained from various donors. Bacteria were incubated on dye-infused plates and decolourization was monitored by visual inspection. Taxa exhibiting high azoreductase activity belonged to the genera *Clostridium*, *Hungatella*, *Enterocloster*, *Veillonella*, *Dielma*, *Eggerthella*, *Odoribacter*, and *Phocaeicola*. The azo dye reduction by these species was corroborated by performing whole bacterial cell kinetic experiments in addition to observing the effect of azo dye on bacterial growth. The genome sequences of two *Veillonella* spp. with high azo dye reduction activities were examined; candidate genes were cloned and the corresponding recombinant proteins were expressed. However, none of the proteins tested showed azo dye reduction activity in vitro.

Curriculum Vitae: Riley completed her B.Sc. (Hons.) in Biomedical Toxicology at the University of Guelph in Fall 2018. She began her M.Sc. of Molecular and Cellular Biology with a specialization in Toxicology under the supervision of Dr. Emma Allen-Vercoe and Dr. David Josephy in Winter 2019.

Publications: Renwick, S., Ganobis, C. M., Elder, R. A., Gianetto-Hill, C., Higgins, G., Robinson, A. V., Vancuren, S. J., Wilde, J., & Allen-Vercoe, E. (2021). Culturing Human Gut Microbiomes in the Laboratory. *Annual Review of Microbiology*, 75(1), 49–69.