



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

SARAH VANCUREN

On Thursday, December 16, 2021 at 1:30 p.m. (online)

Thesis Title: **Modeling the non-industrial gut microbiota: effect of diet on structure and function**

Examination Committee:

Dr. Jasmin Lalonde, Dept. of Molecular and Cellular Biology (Exam Chair)

Dr. Emma Allen-Vercoe, Dept. of Molecular and Cellular Biology

Dr. George van der Merwe, Dept. of Molecular and Cellular Biology

Dr. Matthew Sorbara, Dept. of Molecular and Cellular Biology

Advisory Committee:

Dr. Emma Allen Vercoe (Advisor)

Dr. George van der Merwe

Dr. Nicole Ricker

Abstract: The gut microbiota of non-industrial populations is known to be more diverse than the gut microbiota of industrial populations. The ‘missing’ microbes hypothesis would implicate microbes lost in industrial populations in the rise of non-communicable diseases that non-industrial populations appear to be protected against. This thesis aims to expand what is currently known of non-industrial gut microbiota by studying the Yanomami, a semi-nomadic hunter-gatherer population of the Amazon rainforest. Marker gene sequencing was conducted on Yanomami fecal samples (n = 9) and expeditioner fecal samples (n = 2) to determine the microbial community structure of this remote population, and whether non-industrial microbes were present in a Western expeditioner on their travels. Culture-based approaches and *in vitro* modelling with a chemostat system were conducted on two Yanomami samples and one expeditioner sample to obtain a reference library of non-industrial gut microbiota and determine whether non-industrial gut microbiota could be sustained *in vitro*. It was determined that the Yanomami samples had higher richness than the expeditioner, and a total of 929 strains representing 296 species across 9 phyla were isolated from Yanomami samples. One of the first cultivated *Treponema* spp. from the human gut was obtained from the Yanomami samples. By adapting the distal gut chemostat model to account for differences in diet in industrial and non-industrial populations, it was found that the adapted system could sustain microbial diversity and functionality. The results from this thesis complement previous findings from other non-industrial gut microbiota and are the first to demonstrate *in vitro* modelling of the non-industrial gut microbial community that can next be used to study the impact of various stimuli, including consequences of industrialization factors on the non-industrial gut microbiota without the use of human subjects.

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Curriculum Vitae: Sarah completed her B.Sc. with Honours in Bioinformatics at the University of Saskatchewan in 2019 and began her M.Sc. in Molecular and Cellular Biology that same year in the lab of Dr. Emma Allen-Vercoe.