
Education

MASTER OF SCIENCE IN ENVIRONMENTAL AND LIFE SCIENCES (GPA: 4.3/4.3)

Thesis: Insights into the Population Dynamics and Microbiome of Mosquitoes in Manitoba
Brandon University | April 2020-June 2022 | Runner up for the Gold Medal Award in Science

BACHELOR OF SCIENCE IN BIOLOGY

University of Winnipeg | September 2014-February 2019 | Dean's Honour List Distinction

Experience

Public Health Agency of Canada – National Microbiology Laboratory Branch

Laboratory Technician, Field Studies Section (April 2025-Present)

- Facilitates national vector-borne disease surveillance and research by performing molecular testing (real-time PCR, multilocus sequence typing) on ticks, mosquitoes, and other samples for pathogens such as *Borrelia* spp., *Anaplasma phagocytophilum*, *Babesia* spp., Powassan virus, West Nile Virus, Eastern Equine Encephalitis virus, and California Serogroup viruses.
- Conducts arthropod morphological and molecular identification as well as dissection to support national surveillance and research projects.
- Supports national human diagnostic PCR testing for various zoonotic pathogens.
- Contributed to the establishment of a laboratory tick-rearing program, including the design and optimization of silicone-based artificial feeding systems for *Ixodid* ticks, and the development of associated standard operating procedures and biosafety guidelines.

Program Coordinator, Innovative Diagnostics Program (October 2022-March 2025)

- Coordinated two international external quality assurance (EQA) programs for HIV-1 diagnostics, serving **1,000+ participants in 32 countries**, including quality control preparation, stakeholder engagement, corrective actions, and reporting to stakeholders, senior management and global partners (e.g. World Health Organization).
- Facilitated national EQA programs for respiratory pathogens (e.g., SARS-CoV-2, RSV, Influenza), hepatitis, chlamydia and gonorrhoea testing, **servicing 400+ stakeholders across Canada**, including provincial and territorial point-of-care laboratories, Indigenous communities, and non-governmental organizations.
- Developed an automated report and document generation process using R, RMarkdown, Power BI, and Excel, increasing program efficiency and accuracy, and reducing the time spent conducting manual tasks by **160 hours** annually.
- Conceived, designed, and deployed a desktop application using R and Bash to increase data accessibility for point-of-care test data, enhancing decision-making processes, and reducing time spent entering data internally. The app has been adopted by multiple units within the division and has been installed on over 200 instruments.
- Reduced program costs by **\$12,000** annually through innovative quality control material development while maintaining high standards of program quality.
- Conducted data analysis for program performance assessment and participant reporting.
- Authored over 100 Standard Operating Procedures (SOPs) to ensure ISO compliance and enhance program sustainability and operational resilience.

Experience, continued

Brandon University | April 2020-June 2022

Graduate Researcher (April 2020-June 2022)

- Managed all facets of several mosquito surveillance research projects, leading a team of 6 research assistants and processing **~300,000 mosquitoes** over two years, resulting in the detection of Cache Valley Virus in two mosquito pools.
- Developed and optimized SOPs for mosquito trapping, identification, RNA isolation and RT-PCR, enhancing RNA yield, quality, and sensitivity.
- Conducted and trained staff in lab techniques and field work (mosquito trapping, identification, RNA isolation and RT-PCR).
- Performed data analysis for pathogen surveillance, modelling trap count data with weather variables, and conducting metatranscriptomic analyses identifying **66 viruses, including 17 novel viruses** through next-generation sequencing.
- Authored detailed reports for municipalities, Manitoba Health, and the Public Health Agency of Canada providing surveillance results and public protection recommendations.

Contract Bioinformatician (January-May 2022)

- Developed bioinformatics workflows for a pilot tick next-generation sequencing project to inform future grant application decisions, resulting in the identification of several viruses and bacteria.

Cibus | Summer 2022 (Contract)

Research Assistant

- Analyzed canola field data and provided statistical insights using R to inform future research site selection and experimental design.

Teaching Experience

Sessional Instructor, Diseases Course 15:366 (January–May 2022)

- Delivered pre-lab presentations, designed and implemented teaching experiments, prepared laboratory materials, provided feedback on assignments, and facilitated student engagement in lab sessions for 50 students at Brandon University.

Teaching Assistant, Biodiversity & Interactions Course 15:163 (January–May 2021)

- Delivered pre-lab presentations, provided feedback on assignments, and facilitated student engagement in virtual lab sessions for 75 students at Brandon University.

Skills

- **Data Analysis Tools:** R (Tidyverse, Shiny, RMarkdown, Quarto), Excel, Power BI.
- **Data Analysis Skills:** Automated data processing (Power Automate, GitHub Actions, R package development, RMarkdown and Quarto), statistical modeling (GLMMs), data visualization (ggplot2, Shiny, Power BI), application development (Shiny) and dashboarding (Shiny, Power BI).
- **Laboratory:** Nucleic acid isolation, RT-PCR design and implementation, assay validations, ELISA, biosafety level 2+ (enhanced) best practices, and insect identification, dissection, handling, and rearing.
- **Research:** Planning experiments, analyzing data, interpreting results, writing reports and manuscripts and designing posters and presentations to explain research findings.
- **Bioinformatics Tools:** CLC Genomics Workbench, R (Phylotools, BioConductor), MEGAX, SPADES, Trimmomatic, Bowtie2.

Publications

1. **Cole Baril**, Christophe M R LeMoine, Bryan J Cassone, Black queen cell virus detected in Canadian mosquitoes, *Journal of Insect Science* 23, 2 (2023). <https://doi.org/10.1093/jisesa/lead016>
 2. **Baril, C.**, Pilling, B.G., Mikkelsen, M.J. et al. The influence of weather on the population dynamics of common mosquito vector species in the Canadian Prairies. *Parasites Vectors* 16, 153 (2023). <https://doi.org/10.1186/s13071-023-05760-x>
 3. **Baril C**, Cassone BJ. Metatranscriptomic analysis of common mosquito vector species in the Canadian Prairies. *mSphere* 9:e00203-24 (2024). <https://doi.org/10.1128/msphere.00203-24>
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Presentations & Press

- Served as a panelist for Red River College Polytechnic's Science Laboratory Technology Program, speaking to students about transitioning into the workforce; provided advice on job searching, shared expectations for starting a laboratory career, and answered student questions (November 2025, Winnipeg).
 - Designed and delivered a poster presentation for "Take Our Kids to Work Day" about ticks and tick-borne diseases for grade 9 students at the National Microbiology Laboratory Branch, and ran a booth where students got to identify ticks under a microscope (November 2025, Winnipeg).
 - Designed and delivered a guest lecture for Brandon University's Diseases course titled "Tick-borne pathogen surveillance at the National Microbiology Laboratory Branch" (October 2025, Winnipeg).
 - Designed and presented a presentation titled "QASI-EID & QASI-VL - A Programmatic Approach to Improving Program Efficiency" where I provided an overview of the work I have done to increase the efficiency of program delivery programmatically through the use of R and automation tools (April 2024).
 - Presented at the JC Wilt 10th Year Anniversary Poster Symposium on "Development of a User-Friendly App to Clean GeneXpert Data," and won the "Best Poster Presentation" award (August 2023, Winnipeg).
 - Designed a poster entitled "Five Years with QASI EQA Program for EID and Viral Load POCT: An important tool in the management of the PMTCT Program in Cameroon" that was presented at the African Society for Laboratory Medicine conference (December 2023, Cape Town, South Africa).
 - Delivered research presentations at various scientific conferences, including the Entomological Society of America (November 2021, Denver, Colorado, USA), West Nile Virus Scientific Committee Meeting (August 2022, virtual meeting), and PHAC's National Vector Borne Disease Information Sharing Table (August 2022, virtual meeting).
 - Various press appearances during my tenure as a Graduate Researcher at Brandon University (2020 – 2022) including in [Entomology Today](#), [CBC Radio Canada](#), Brandon University's [Research Connection](#), and several local municipal newsletters on topics related to mosquito-borne pathogen research (*What's Up Yellowhead*, *Shoal Lake Newsletter*, and *Cypress River Newsletter*).
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Other Interests

Baking, fitness, coffee, contributing to open-source programming projects, and spending time with my cat named Tomatoes.