Cole **Baril**

Quality Analyst at the National Microbiology Laboratory

Winnipeg, Manitoba, Canada

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Profile

- Over 4 years of experience working in microbiology laboratories on projects related to molecular diagnostics, public health, virology and quality assurance.
- Oversees two international external quality assurance programs for HIV-1 point-of-care diagnostics.
- Planned, organized, designed, managed, and evaluated all stages of scientific projects as a researcher on neglected mosquito-borne pathogen research in Manitoba, including working independently and coordinating scientific teams.
- Conceived, developed and deployed a user-friendly desktop application to increase point-of-care diagnostics data accessibility.
- Identified the presence of mosquito-borne bunyaviruses in mosquitoes in Manitoba.
- Identified 66 viruses (17 novel viruses) and >60 parasites and fungi harboured by mosquitoes in Manitoba.
- Presented my mosquito research to local (Winnipeg Insect Control Branch), Provincial (Manitoba Health) and Federal (Public Health Agency of Canada) governments.

Education

Master of Science — *Brandon, Manitoba*

Brandon University — *2022*

- Thesis: Insights into the Population Dynamics and Microbiome of Mosquitoes in Manitoba
- Supervisor: Dr. Bryan Cassone
- Distinctions: Runner up for the Gold Medal in Science

Bachelor of Science — *Winnipeg, Manitoba*

The University of Winnipeg — *2019*

- Distinctions: Dean's Honour List

Experience

Quality Analyst — *Winnipeg, Manitoba*

National Microbiology Laboratory - Public Health Agency of Canada — *2022-Present*

- Oversees two international quality assurance programs for HIV-1 diagnostics and viral load monitoring in >30 countries and developing domestic quality assurance programs for HIV-1 and chlamydia and gonorrhea.
- Responsible for program planning, preparation of program documents (waybills, commercial invoices, instructions for participants, participant performance reports), preparation of proficiency panels (contrived blood and plasma samples with HIV-1 spiked in; use of Scinomix tube labeller and Hamilton Robotic Liquid Handler), shipment of proficiency panels following TDG guidelines, participant results tracking, communications (announcements, informing participants of important dates, reminders, answering questions and providing program information, sending reports), and evaluating the program (e.g., assessing and testing statistical methods, quality control materials).
- Exploring and implementing cost-cutting measures while maintaining the same standard of quality. Saved $12,000 annually by developing new quality control materials that perform just as well, and in some cases better, than the previous material.
- Conduct quality inspections and perform quality assurance testing on HIV, SARS-CoV-2, Influenza, and RSV samples using GeneXpert and m-PIMA Analyser.
- Automate report generation processes using R, enhancing program efficiency.
- Maintain lab safety and accuracy through good laboratory practices.
- Prepare documents and packages for international shipments to Africa, Europe, and South America.
- Develop, research, and evaluate new quality control materials (HIV-1, CT/NG) for ongoing quality control programs.
- Developed a user-friendly desktop application using R to increase point-of-care data accessibility.
- Assists with poster, presentation and infographic preparation by curating custom graphics using R and designing posters and presentations using PowerPoint and Quarto and Revealjs for use by management.
- Authors and maintain standard operating procedures (SOPs); participate in biweekly SOP meetings to ensure consistency among programs and identify gaps in the current SOP library.

Graduate Researcher

Brandon, Manitoba

Brandon University, Biology Department *2020-2022*

- Planned, organized, and managed all facets of several research projects related to mosquito surveillance, including leading a team of research assistants.
- Coordinated mosquito-borne bunyavirus surveillance by RT-PCR.
- Analyzed RNA Sequencing data to characterize the mosquito microbiome of mosquitoes in Manitoba.
- Procured mosquito trapping and weather data for statistical analysis.
- Managed inventory control for laboratory supplies and prepare purchase requisitions.
- Utilized strong project management skills in independently planning, organizing, designing, and delivering scientific (biology) projects within Brandon University.
- Employed sound operational decision-making skills for strategic planning, materials, equipment, analysis techniques, software usage and all aspects of the project.
- Administered project operating budgets, including diligently controlling labour and research procurement costs to meet fiscal and project goals with limited resources.
- Prepared weekly, monthly and annual reports on mosquito surveillance findings for 2020 and 2021 and shared data with the Manitoba's West Nile Surveillance Program, Manitoba Health (Manitoba Government) and the Public Health Agency of Canada (Canadian Government).
- Established connections with a network of other scientists throughout North America to discuss their research and request information to enhance lab surveillance projects by learning best practices.

Contract Bioinformatician

Brandon, Manitoba

Brandon University, Biology Department *2021*

- Informed future grant application decisions by heading a pilot tick NGS bioinformatics project.
- Created a bioinformatics workflow to analyze tick NGS data.
- Identified what microbes were present in tick NGS data.
- Trained a staff member one-on-one on bioinformatics principles and molecular biology techniques.

Research Assistant

Winnipeg, Manitoba

Cibus, Product Development (Contract) *2022*

- Created, edited and reviewed fieldbooks for field observation collection using Excel.
- Authored a report detailing the relationships between weather variables and Sclerotinia infection of canola plants.
- Made educated reccomendations for future research site selection.
- Visited experimental canola plots to observe plant quality, infestations, weed status and presence of disease.
- Compiled photos and reports of field visits into Microsoft OneNote files for each site.

Greenhouse Assistant

Winnipeg, Manitoba

DL Seeds, Breeding Program *2020*

- Assisted in canola breeding programs by cross-pollinating plants in compliance with the supervisor's instructions and caring for healthy plants and those infected with pathogens (e.g., Sclerotinia and clubroot) in high-tech greenhouses and growth rooms.
- Prepared plant samples for marker testing for agricultural studies.
- Seeded, transplanted, and harvested canola plants.
- Logged experiment data in Excel.

Teaching

Sessional Instructor (Diseases 15:366)

Brandon, Manitoba

Brandon University, Biology Department *2022*

- Prepared laboratory materials, media, and organisms.
- Created relevant quizzes and tests. Grade quizzes, tests, and assignments.
- Researched, designed, and delivered pre-lab presentations.
- Supported, tutored, and guided students during lab sessions.

Teaching Assistant (Biodiversity, Functions and Interactions 15:163)

Brandon, Manitoba

Brandon University, Biology Department *2021*

- Prepared and delivered pre-lab briefings in two lab sections prior to student experiments to explain concepts and procedures using the Zoom virtual platform.
- Assisted students using MacMillan Learning Software during lab procedures and responded to questions.
- Graded assignments and tests. Provided written and oral critiques to improve student performance.
- Assisted the professor in test creation.

Publications

1. **Cole Baril**, Christophe M R LeMoine, Bryan J Cassone, Black queen cell virus detected in Canadian mosquitoes, *Journal of Insect Science*, Volume 23, Issue 2, March 2023, 10, https://doi.org/10.1093/jisesa/iead016
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. 2024. Metatranscriptomic analysis of common mosquito vector species in the Canadian Prairies. *mSphere9:e00203-24*. https://doi.org/10.1128/msphere.00203-24

Presentations

Development of a User-Friendly App to Clean GeneXpert Data - Enhancing Point of Care Diagnostics in Canada — *Winnipeg, Manitoba*

Designed and delivered a poster presentation for the JC Wilt Infectious Diseases Research Centre (PHAC) 10 Year Anniversary Poster Competition — *2023*

Mosquito-borne bunyavirus surveillance and mosquito-weather relationships in Manitoba — *Winnipeg, Manitoba*

Designed and delivered a research presentation for the August 23 West Nile Virus Scientific Committee Meeting — *2022*

Mosquito Surveillance and California Serogroup in Manitoba — *Winnipeg, Manitoba*

Designed and delivered a poster presentation for the August 10 National Vector Borne Disease Info Sharing Table — *2022*

Characterizing the Microbiome of Manitoban Mosquitoes — *Winnipeg, Manitoba*

Designed and delivered a poster presentation for the 2022 North Central Mosquito Control Association 2022 Annual Meeting — *2022*

Neglected mosquito-borne pathogen surveillance in Manitoba, Canada — *Denver, Colorado*

Designed and delivered a poster presentation for the 2021 Entomological Society of America Conference — *2021*

Mosquito Surveillance for California Serogroup and Cache Valley Viruses in Manitoba — *Brandon, Manitoba*

Designed and delivered a research presentation for the 2020 Brandon University Science Seminar Series — *2020*

Press

CBC Radio Canada — *Winnipeg, Manitoba*

Featured in a CBC article titled "Manitoba researchers discover 17 new viruses in mosquitoes" — *2024*

Research Connection - Brandon University — *Brandon, Manitoba*

Authored an article titled "Mosquito surveillance in Manitoba" — *2022*

Shoal Lake Community Newsletter — *Shoal Lake, Manitoba*

Research featured in the Shoal Lake June 2020 Newsletter — *2020*

What's Up Yellowhead Newsletter — *R.M. of Yellowhead*

Research Featured in the What's Up Yellowhead June 2020 newsletter — *2020*

Cypress River Community Newsletters — *R.M. of Victoria*

Research updates featured in Cypress River community newsletters — *2020-2022*

Skills

Laboratory Skills

Skilled in the following laboratory procedures:

- RNA/DNA extraction
- Mosquito identification, handling, and rearing
- Reverse transcriptase reactions
- Polymerase chain reaction setup
- Polymerase chain reaction design
- Gel electrophoresis
- ELISA
- Aseptic techniques
- Media preparation and pouring
- RNA interference design
- Primer design and troubleshooting
- GeneXpert setup, machine and software
- m-PIMA setup and machine
- Containment Level 2+ (enhanced) laboratory best-practices
- Handling blood
- Handling urine
- Dried blood spots (preparation and processing)
- Minivettes and lancets for fingerstick blood collection

Laboratory Equipment

Familiar with the following laboratory equipment:

- Dissection and compound microscope
- Light microscope camera
- CDC light trap
- Ultracold freezer
- Micropipette and pipette
- Multi-dispenser pipettes
- Serological pipette
- Microcentrifuge
- Dry and wet bath
- Thermocycler
- Gel electrophoresis apparatus
- Bio-Rad ChemiDoc Imaging System
- Autoclave
- Incubator
- Fume hood
- Implen NanoPhotometer
- Microplate photometer
- Biological safety cabinet
- Hamilton Scarlet Liquid Handler
- Scinomix Tube Labeller
- Cepheid GeneXpert
- Abbott m-PIMA

Computer Skills

Through knowledge of the following programs and languages:

- Microsoft Office Suite (Word, Excel, PowerPoint, Teams, Power Automate, Power BI, Sharepoint and Outlook)
- Zoom
- Windows
- Google Sheets
- Netlify (website hosting)
- R
- RStudio
- Tidyverse
- RMarkdown & Markdown
- HTML
- Webscraping
- Data Manipulation, transformation and organization using R (tidyverse)
- Data visualization using R (ggplot2)
- Familiar with the Environment Canada weather database
- Experience manipulating and analyzing weather data

Bioinformatics

Expert knowledge of the following bioinformatics tools:

- Next generation sequencing analysis
- CLC Genomics Workbench
- Chan Zuckerberg ID
- MEGAX for phylogenetic and sequence analysis
- Familiar with NCBI databases (e.g., nr, protein, nucleotide)
- Familiar with NCBI web applications (e.g., BLAST suite, ORFfinder, conserved domains)
- Visualization of NGS results using RStudio