

AMBER R. PAULSON, PhD – Bioinformatic Scientist

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Citizenship: Canadian 



COMPUTATIONAL GENETICS | MOLECULAR MICROBIOLOGY | PATHOGEN EVOLUTION

Bioinformatic scientist and molecular geneticist specializing in RNA biology, transcriptomics, computational genomics, and host-pathogen interactions. I lead and originated research on epigenetic interference, a framework describing how pathogen-derived non-coding small RNAs have evolved to regulate virulence and host response to infection. My work integrates computational genomics with comparative transcriptomic and evolutionary analysis, advancing RNA-based research for pandemic preparedness through increasing knowledge of how zoonotic pathogens emerge.

POSTDOCTORAL APPOINTMENTS

2023-2025 Jeffrey Joy Lab, B.C. Centre for Excellence in HIV/ AIDS and Faculty of Medicine at University of B.C.

- Evolution of epigenetic interference in SARS-CoV-2 and SARS-CoV-1 (see [2026 article](#))
- Developed and maintain an open access bioinformatics pipeline (see [GitHub](#))

2020-2021 Robert Colautti Lab, Biology Department, Queen's University (Kingston, Ontario, Canada)

- Tick microbiome, meta-transcriptomics, and phylogenetics of tick-borne pathogens (see [2023 article](#))
 - Developed and maintain an open access bioinformatic pipeline for tick microbiome (see [GitHub](#))
 - Conceptualized use of blocking primers for enhanced pathogen detection in *Ixodes scapularis* (see [bioRxiv](#))
 - Contributed to mentorship and training of next generation of tick researchers
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ACADEMIC DEGREES

2020 PhD in Genetics, Massey University, Auckland New Zealand

- **Thesis:** "Temperature- and host-dependent regulation of virulence factors in an insect pathogenic bacterium, *Yersinia entomophaga*"

2014 MSc in Biology, University of Victoria, Victoria, B.C. Canada

- **Thesis:** "The microbial associates and putative venoms of seed chalcid wasps (Hymenoptera: Torymid: *Megastimigus*)"

2007 BSc in Biology, Vancouver Island University, Nanaimo, B.C. Canada

SCHOLARSHIPS AND AWARDS

- **Postdoctoral**

2023-2025 Michael Smith Labs – B.C. Health Research Training Fellowship

- **Doctoral**

2016-2019 Universities New Zealand – Commonwealth Scholarship and Fellowship Plan

2015 *Declined* – Alexander Graham Bell Canada Graduate Scholarships¹

2015-2018 Natural Science and Engineering Research Council of Canada – Postgraduate Scholarship

- **Masters**

2012 University of Victoria – M.C. Melburn Award

2011 University of Victoria – Amelia Leith Memorial Fellowship

- **Undergraduate**

2007 National Science and Engineering Research Council of Canada – Undergraduate Research Award

¹ Awarded to the top-ranked PhD students in Natural Sciences & Engineering by the Natural Science and Engineering Research Council of Canada.

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PROFESSIONAL WORK EXPERIENCE

- 2013-2015; Environmental Assessment Office, B.C. Ministry of Environment and Parks, Victoria B.C.
- 2020 to current
- **Project Assessment Officer**, administration of environmental assessment of major projects in B.C., including infrastructure, power and energy projects
 - Discharging the Crown's duty to consult with First Nations on Section 35 rights and implementing the United Nations Declaration on the Rights of Indigenous People
- 2011 Aquaculture Resource Management, Fisheries and Oceans Canada, Nanaimo B.C.
- **Aquaculture Management Coordinator**, fisheries aquaculture management
 - Discharging the Crown's duty to consult with First Nations on Section 35 rights
- 2007-2011 McNaughton Environmental Consultants, Nanaimo, B.C.
- **Fisheries Field Biologist**, fisheries stock assessments, environmental monitoring
- 2005; 2006 Mount Arrowsmith Biosphere Foundation, Vancouver Island, Squamish, B.C.
- **Seasonal Field Assistant**, biodiversity studies, climate change and alpine environments
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TEACHING, MENTORING, OUTREACH

- 2024 **Accredited Training Seminar²**: *The RNA Revolution: From dark matter to major therapeutic breakthroughs*
- B.C. Centre for Excellence in HIV/ AIDS, Learning Series Webinar, Cullen Family Lecture Theatre, St. Paul's Hospital/ in-person (recorded) and virtual
- 2022 **Talk**: *Exploring the inner world of important Lyme disease vector Ixodes scapularis*
- Edge of Lyme hack-a-thon event, Queen's University (Kingston Ontario), virtual
- 2021 **Workshop**: *Bioinformatics approaches for data analysis of short-read sequence data*
- Queen's Bioinformatics Advanced R Workshop, Queen's University (Kingston Ontario), virtual
- 2020 **Trainee Series Webinar**: *Tools for Bioinformatics Short-Read Sequence Data Processing*
- Canadian Lyme Disease Research Network, virtual event
- 2020 **Project Leader**: *Modelling potential microRNA interactions in SARS-CoV-2³*
- HackSeq RNA, COVID-19 Ultra-hackathon, virtual event⁴
- 2012-2013 **Laboratory Instructor**: General Biology 190A/190B, Biology Department, University of Victoria
- 2013-2015 **Lead Coordinator**: Canadian Association for Girls in Science, Victoria B.C. Chapter
- 2006 **Laboratory Instructor**: Entomology Biology 492, Biology Department, Vancouver Island University
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TALKS AND PRESENTATIONS

- 2026 **Flash talk and poster**: *Revealing epigenetic interference in SARS-CoV-1 and SARS-CoV-2 through functional genomic analysis*
- RNAXUBC 2026; Vancouver, B.C. Canada
- 2026 **Flash talk and poster**: *Functional genomic analysis reveals mechanisms of epigenetic interference in SARS-CoV-1 and SARS-CoV-2*
- 33rd International Dynamics and Evolution of Human Viruses; Kelowna, B.C. Canada
- 2025 **Flash talk**: *Functional insights from virus-derived RNA fragments identifies epigenetic interference mechanism in SARS-CoV-2*
- Vancouver RNA Club Research Symposium, University of B.C.

² Accredited by the College of Family Physicians of Canada and the B.C. Chapter (up to 1 Mainpro+ credit).

³ A short video was produced by the team <https://youtu.be/pxTEwiW6TJU>

⁴ Awarded second prize for "best participant feedback"

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(talks and presentations continued)

- 2025 **Talk:** *Sequencing analysis for functional insights from virus-derived RNA fragments identifies epigenetic interference mechanism in SARS-CoV-2*
- Toronto RNA Enthusiasts' Day (TREN D) 2025, virtual
- 2025 **Flash talk and poster:** *Sequencing analysis for functional insights from virus-derived RNA fragments identifies epigenetic interference mechanism in SARS-CoV-2*
- Annual General Meeting, American Society for Virology⁵; Montreal, Q.C. Canada
- 2025 **Talk:** *Exploring small viral RNA-mediated epigenetic interference as an evolutionary driver in SARS-CoV-related viruses using sequencing analysis*
- EVO-WIBO; Semiahmoo, WA United States
- 2024 **Talk:** *Small viral RNA evolution and the origin of SARS-CoV-2: Insights from functional genomics.*
- 31st International Dynamics and Evolution of Human Viruses; Squamish, B.C. Canada
- 2022 **Invited talk:** *Multi-omics analysis identifies symbionts and pathogens of blacklegged ticks (Ixodes scapularis) from a Lyme disease hotspot in southeastern Ontario, Canada*
- B.C. Centre for Disease Control, Tick-borne and Climate Change (West) quarterly check-in; virtual
- 2020 **Invited symposium:** *Unbiased metagenomic analysis of Ixodes scapularis microbiomes in the Kingston Frontenac region*
- Annual General Meeting, Canadian Lyme Disease Research Network; virtual
- 2020 **Invited seminar:** *From venoms to virulence factors, transcriptomics provides insights into challenging systems*
- Agriculture and Agri-Food Canada; Agassiz, B.C. Canada
- 2018 **Talk:** *Exploring the potential role of cold-shock proteins as regulators of virulence in the insect pathogenic bacteria, Yersinia entomophaga*
- New Zealand Microbiological Society Conference; Dunedin, New Zealand
- 2018 **Talk:** *The in vivo transcriptome of the insect pathogen, Yersinia entomophaga*
- Australian Society for Microbiology Conference⁶; Brisbane, Australia
- 2018 **Poster:** *The in vivo transcriptome of the insect pathogen, Yersinia entomophaga*
- American Society for Microbiology Conference; Atlanta, GA United States
- 2017 **Invited symposium:** *From venoms to virulence factors – Revealing ecological and evolutionary insights with RNA-seq*
- Entomological Society of America, Denver, CO, United States
- 2017 **Talk:** *The in vivo transcriptome of the insect pathogen, Yersinia entomophaga*
- New Zealand Microbiological Society Conference⁷, Auckland, New Zealand
- 2016 **Talk:** *In vivo RNA-seq – in a pinch*
- New Zealand Microbiological Society Conference, Christchurch, New Zealand

PUBLICATIONS

- Paulson, A.R.,** Montoya, V., and Joy, J.B. 2026. Functional genomic evidence for candidate small viral RNA-mediated epigenetic interference in SARS-CoV-1 and SARS-CoV-2. Computational and Structural Biotechnology Journal, 35(2), 0148 <https://doi.org/10.34133/csbj.0148>
- Paulson, A.R.,** O'Callaghan, M., Zhang, X.-X., Naren, N., Schoof, M., and Hurst, M.R.H. 2025. Two transcription factors and one antisense RNA underlie the thermoregulated insect pathogenicity of *Yersinia entomophaga* MH96. Gene, 149955 doi.org/10.1016/j.gene.2025.149955

⁵ Travel award from American Society for Virology 2025

⁶ Travel Award New Zealand Microbiological Society

⁷ Best Student Talk Award New Zealand Microbiological Society

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(publications continued)

- Sreevatshan, K.S., Afsharnezhad, S., **Paulson, A.R.**, Bourne, D.C., Sun, Z., Carver, L.F., Tirani, J., Wong, H., Sjaarda, C.J., He, S., Sheth, P.M., and Colautti, R.I. 2026. Blocking primer improves detection of tick-borne pathogens in *Ixodes scapularis* (black-legged ticks) from a Lyme disease hotspot region in eastern Ontario, Canada. bioRxiv <https://doi.org/10.64898/2026.08.17.745364>
- Schoof, M., O'Callaghan, M., Hefer, C., Glare, T.R., **Paulson, A.R.**, and Hurst, M.R.H. (2023). Lysis cassette-mediated exoprotein release in *Yersinia entomophaga* is controlled by a PhoB-like regulator. Micro. Spectrum, 11(2), e00364-23 doi.org/10.1128/spectrum.00364-23
- Paulson, A.R.**, Loughheed, S.C., Huang, D., and Colautti, R.I. (2023). Multiomics reveals symbionts, pathogens, and tissue-specific microbiome of blacklegged ticks (*Ixodes scapularis*) from a Lyme disease hot spot in southeastern Ontario, Canada. Microbiology Spectrum, 11(3), e01404-23 doi.org/10.1128/spectrum.01404-23
- Paulson, A.R.**, O'Callaghan, M., Zhang, X.-X., Rainey, P.B., and Hurst, M.R.H. (2021). *In vivo* transcriptome analysis provides insights into host-dependent expression of virulence factors by *Yersinia entomophaga* MH96, during infection of *Galleria mellonella*. G3: Genes, Genomes, Genetics: 11(1) 1-12 doi.org/10.1093/g3journal/jkaa024
- Paulson, A.R.**, Ehrling, J., von Aderkas, P., and Perlman, S.J. (2020). Whole-body transcriptome of seed-parasitic wasp, *Megastigmus spermotrophus*, reveals ecological and evolutionary insights, in Shelomi, M. (ed.) *Transcriptomics in Entomological Research*. CAB International, pp. 113-135 doi.org/10.1079/9781789243130.0113
- Paulson, A.R.**, Le, C., Dickson, J., Ehrling, J., von Aderkas, P., and Perlman, S.J. 2016. Transcriptome analysis provides insight into venom evolution in a seed-parasitic wasp, *Megastigmus spermotrophus*. Insect Molecular Biology: 25(5) 604-616 doi.org/10.1111/imb.12247
- Paulson, A.R.**, von Aderkas, P., and Perlman, S.J. 2014. Bacterial Associates of Seed-Parasitic Wasps (Torymidae: *Megastigmus*). BMC Microbiology 14.1: 224 doi.org/10.1186/s12866-014-0224-4
- Epelbaum, A., Therriault, T.W., **Paulson, A.R.**, and Pearce, C.M. 2009. Botryllid tunicates: Culture techniques and experimental procedures. Aquatic Invasions. 4(1): 111-120
- Epelbaum, A., Pearce, C.M., Barker, D.J., **Paulson, A.R.**, and Therriault, T.W. 2009. Susceptibility of four non-indigenous Ascidian species in British Columbia (Canada) to invertebrate predation. Marine Biology. 156(6): 1311-1320
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PEER REVIEWER

- BMC Biology, BMC Genomics, Environmental Entomology, Insect Science, Molecular Ecology, and Tick and Tick-borne Diseases
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PROFESSIONAL MEMBERSHIPS

- The RNA Society
 - Vancouver RNA Club
 - Canadian Society of Microbiologists
 - American Society for Virology
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🔗 References available on request 🔗