Notice of the Final Oral Examination
for the Degree of Master of Science

of

AUDREY McPHERSON

BSc (University of Victoria, 2018)

“Factors influencing the intriguing persistence of a *Wolbachia* symbiont in spotted wing *Drosophila*”

Department of Biology

Tuesday, May 11, 2021
10:00 A.M.
Conducted Virtually

Supervisory Committee:
Dr. Steve Perlman, Department of Biology, University of Victoria (Supervisor)
Dr. Paul Abram, Department of Biology, UVic (Co-Supervisor)
Dr. Ryan Gawryluk, Department of Biology, UVic (Member)

External Examiner:
Dr. Kevin Floate, Senior Research Scientist, Agriculture and Agri-Food Canada

Chair of Oral Examination:
Dr. Catherine Harding, Department of Art History and Visual Studies, UVic

Dr. Stephen Evans, Acting Dean, Faculty of Graduate Studies
Abstract

*Wolbachia* is a maternally inherited, endosymbiotic bacterium that infects at least 40% of terrestrial arthropods. As a facultative symbiont in the majority of its hosts, *Wolbachia* commonly act as a reproductive parasite; however, there are a number of *Wolbachia* strains that do not cause reproductive manipulations in their hosts and have no apparent fitness enhancement, yet are stably maintained in populations at low to intermediate frequencies. How these strains of *Wolbachia* persist in nature has been a long-standing question and is still unresolved. One explanation for the persistence of such strains is they provide a context-dependent fitness advantage to their hosts. In this thesis, I investigate one such strain of *Wolbachia*, wSuz, which infects the agricultural pest, *Drosophila suzukii*, also known as spotted wing *Drosophila*. To explore the possibility that wSuz may be involved in pathogen protection, I screened wild flies for *Wolbachia* and two naturally occurring RNA viruses, Teise Virus and a recently discovered virus related to Motts Mill Virus. I did not find an association between *Wolbachia* and virus infection. Additionally, I designed an experiment to test whether *Wolbachia* increases host fitness at high larval densities. Intriguingly, although there was no effect of density, the frequency of *Wolbachia* infection changed dramatically in just one generation, but in opposite directions in blocks that were performed a month apart. These results support the hypothesis that *Wolbachia* frequencies can change quickly across generations and provide some type of condition-dependent benefit. The maintenance of *Wolbachia* remains a mystery but my study provides some exciting clues about what conditions may be playing a role.