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

of

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BSc (University of Victoria, 2014)

“Diet Dependent Sex Ratios in *Tigriopus californicus*: Evidence for Environmental Sex Determination in a System with Polygenic Sex Determination”

Department of Biology

Thursday, September 14, 2017
12:00 P.M.
University Centre Building
Room A2017a

Supervisory Committee:
Dr. Steve Perlman, Department of Biology, University of Victoria (Supervisor)
Dr. Louise Page, Department of Biology, UVic (Member)
Dr. Rana El-Sabaawi, Department of Biology, UVic (Member)

External Examiner:
Dr. Brian Starzomski, School of Environmental Studies, UVic

Chair of Oral Examination:
Dr. Monica Prendergast, Department of Curriculum and Instruction, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

By controlling the inheritance of sex, the sex determination mechanism constrains sex allocation strategies and sex ratio adaptation; however, sex ratio selection also influences the evolution of sex determination mechanisms. Much of the sex determination literature focuses on how sex determination mechanisms transition between genetic and environmental factors (*i.e.* GSD vs. ESD), and if genetic sex factors are involved, how many (*e.g.* chromosomal vs polygenic systems). The study of sex allocation largely focuses on deviations in sex ratio from a theoretically 1:1 evolutionarily stable strategy, such as when sex ratios reflect ‘cost’ differences between the sexes. *Tigriopus californicus* is a tidepool copepod with polygenic sex determination, and shows wide variability in sex ratios in the field and lab that cannot be explained by genetic and stochastic processes alone, which suggests that an environmental variable might influence sex ratio. Females and their offspring were fed diets of different nutritional quality in a crossed design, and the sex ratio of each clutch was recorded for up to 8 clutches from a given female: this design allowed the influence of female diet vs. that of her offspring to be distinguished. The clutch sex ratio changed over the laying order according to the offspring’s diet, which is evidence for environmental sex determination in this species. Sex ratio also showed the influence of maternal diet, consistent with sex allocation theory. While dietary carotenoids showed no association with sex ratio or clutch size, long chain polyunsaturated fatty acids (particularly EPA and DHA) were implicated as the agent of sex ratio effect, providing a direction for future studies. The situation of *T. californicus* at the intersection of major themes in sex evolution makes this system an ideal model for selection studies.