Motivated by Transmission? The Behavioural Effects of Parasites on Snail Second Intermediate Hosts

Mark Kristian B. Jovero¹, Catherine J. Unrau¹, Jillian T. Detwiler¹

¹Dept. of Biological Sciences, University of Manitoba, Winnipeg, Manitoba

Abstract

Many parasites that use >1 host to complete their development alter the behaviour of their hosts to increase their survival and the likelihood that they infect their next host. However, we do not understand how commonly this phenomenon occurs in trematode parasites, especially for transmission between freshwater snail hosts. We predicted that first intermediate host snails will attract uninfected, potential second intermediate hosts while snails infected with trematodes that do not use a second intermediate host will not. We collected field-infected snails from wetlands in Manitoba, and identified the family of trematodes using cercarial morphology. Then we used a y-maze to assess the attraction of a responder (lab-raised uninfected Helisoma trivolvis) to a stimulus (field-infected) snail. We found Helisoma trivolvis field snails infected with two morphotypes (armatae, brevifurcate-apharyngeate) and Lymnaea elodes infected with one morphotype (monostome). Monostome and brevifurcate-apharyngeate cercariae do not use snail second intermediate hosts and we confirmed with laboratory exposures that armatae cercariae encysted within snail hosts as metacercariae. Sample sizes are currently small (<30 stimulus snails for each morphotype), but preliminary analysis with armatae-infected stimuli (n=6) suggested no response. This result corroborates the results of behavioural trials with echinostome trematodes when the responder and stimulus snail were H. trivolvis.

Contrary to the prediction, these two types of trematodes did not alter the attraction of second host snails to first host snails. However, these results contrast the increased attraction between responder H. trivolvis and echinostome-infected L. elodes stimulus snails. Thus, not only may altered behaviour depend upon the life cycle but also the particular type of second intermediate hosts involved.

An Extreme Bottleneck in the Founding of a Population of Invasive Ground Squirrel (Atlantoxerus getulus)

Kateryna Kratzer¹, Annemarie van der Marel¹, Colin Garroway¹, Marta Lopez-Darias², Stephen Petersen³, Jane Waterman¹

¹Dept. of Biological Sciences, University of Manitoba, Winnipeg, Manitoba
²Instituto de Productos Naturales y Agrobiología, CSIC, La Laguna, Tenerife, Spain
³Conservation and Research Department, Assiniboine Park Zoo, Winnipeg, Manitoba

Abstract

The founder effect is a genetic bottleneck whereby a population is established by a small number of individuals. The resulting gene pool is limited compared to the source population. Nascent populations established by a few founders are therefore typically small and prone to the detrimental effects of inbreeding and genetic drift. Inbreeding depression, the accumulation of deleterious alleles, can contribute to the extinction of a population. Barbary ground squirrels (Atlantoxerus getulus) on the island of Fuerteventura, Spain, were reportedly introduced as a single pair approximately 50 years ago. This population has since grown to an island population of over a million, impacting the local habitats. We conducted genetic analysis of A. getulus to determine the number of founders and measure the level of genetic diversity using the displacement loop of mitochondrial DNA and microsatellite markers. The samples from across the island showed no variation in the d-loop, indicating a single founding female, while the samples from the source population had varied mitochondrial haplotypes. The microsatellite data revealed low levels of heterozygosity and high levels of inbreeding, with no more than four founding alleles per locus. Our results were consistent with the anecdotal account of a single founding event by two individuals. This population therefore seems to be an ideal model to study founder events. Further investigation may explain how A. getulus has avoided the worst effects of an extreme genetic bottleneck.
Proceedings of the University of Manitoba Undergraduate Research Poster Competition: Titles

**Applied Sciences**

Surface Texture and Frictional Properties of Chipsealed Pavement  
By Sakher Ghanem  
Dept. of Civil Engineering, Faculty of Engineering

Design and Simulation of Coupled Free Space THz Microantennas and Cavities  
By Ryan Shaski  
Dept. of Physics & Astronomy, Faculty of Science

Synthesis of N-heterocyclic Substrates for Electrochemical Hydrogenation  
By Baldeep Sidhu  
Dept. of Chemistry, Faculty of Science

**Health Sciences**

Reproducibility of Electronystagmography Testing  
By Nasser Barakat  
Max Rady College of Medicine, Rady Faculty of Health Sciences

Metis Culture and Youth Wellness  
By Kirsten Fleury  
Dept. of Community Health Sciences, Rady Faculty of Health Sciences

Insights into the Use of Sedative-Hypnotic/Anxiolytics in Primary Care: A Retrospective Study Interim Report  
By Joyce Leung  
Dept. of Microbiology, Faculty of Science

Moving Towards Universal Coverage of Direct-Acting Antiviral Therapies for Hepatitis C Infection in Canada: An Environmental Scan of Provincial and International Jurisdictions  
By Samantha Myers  
College of Pharmacy, Rady Faculty of Health Sciences

Increasing Contraction Intensity Alters Trapezius Muscle Activation Distribution  
By Josee Rochon  
Faculty of Kinesiology and Recreation Management

Mechanisms for Oxidative Stress in Response to Allergen Challenge  
By Alexander Schultz  
Max Rady College of Medicine, Rady Faculty of Health Sciences

Canola Oil Consumption Increases Plasma n3 Fatty Acids in Individuals with Metabolic Syndrome  
By Breanne Semenko  
Dept. of Food and Human Nutritional Sciences, Faculty of Agricultural and Food Sciences

Soldiering On: Identifying Independent Respiratory Infection Factors for Deployed Military Personnel  
By Lea Soliman  
Dept. of Respiratory Therapy, Rady Faculty of Health Sciences

**Natural Sciences**

Soil Water Use of Canola and Oat in a Dry Growing Season  
By Ramanpreet Brar  
Dept. of Plant Science, Faculty of Agricultural and Food Sciences

Separated and Reattached Flow Over Surface-Mounted Bluff Bodies of Varying Aspect Ratio  
By Heath Chalmers  
Dept. of Mechanical Engineering, Faculty of Engineering

Testing the Roles of Generation and Fluency Heuristics on Memory for Event Durations  
By Erin Dowling  
Dept. of Psychology, Faculty of Arts

Modelling the Impact of RNA Lengths on OAS2 Enzyme Activation  
By Kelsey Hildebrand  
Dept. of Mathematics, Faculty of Science

Dietary Polyunsaturated Fatty Acids Alter the Rat Red Gastrocnemius Oxylipin Profile More in Female Compared to Male Rats  
By Avery Penner  
Dept. of Food and Human Nutritional Sciences, Faculty of Agricultural and Food Sciences

Effects of Age on Memory  
By Parisa Sepehri  
Dept. of Psychology, Faculty of Science

Oxylipin Concentrations are Higher in Muscle Tissue Fibres with Higher Oxidative Capacity  
By Victoria Waytt  
Dept. of Food and Human Nutritional Sciences, Faculty of Agricultural and Food Sciences

Expression of Cortisol Related Genes in Lake Sturgeon Using an Alternative Embryo Rearing Technique  
By Cobi Wiwchar  
Dept. of Genetics, Faculty of Science

Oil-in-Ice Mesocosm Experiment: The Effects of Weathering Processes on Crude Oil Composition in an Arctic Marine Environment  
By Teresinha Wolfe  
Dept. of Environment and Geography, Clayton H. Riddell Faculty of Environment, Earth, and Resources

**Frontiers of Undergraduate Research**
Social Sciences & Humanities

Exploring an Imagined Canadian Identity through Music in Teaching Materials
By Jennifer Arcand
Desautels Faculty of Music

An Intriguing Effect of Delayed Masking on Visual Attention found in EEG Patterns
By Evan Forest
Dept. of Psychology, Faculty of Science

Internationalization and Equity Paradox in Canadian Universities
By Melissa Guenter
Faculty of Education

The Relationship Between Non-Financial Sector Growth and Financial Deepening in Canada
By Nicholas Liang
Department of Economics, Faculty of Arts

Biocultural Diversity in Action: The Rainbow Community Garden
By Laura Lucas
Dept. of Environment and Geography, Clayton H. Riddell Faculty of Environment, Earth, and Resources

A Test of Meaning-Based Influences on Time Perception
By Carly McFall
Dept. of Psychology, Faculty of Arts

Struggle and Solidarity: The Heritage of the National Farmers Union
By Asha Nelson
Global Political Economy Program, Faculty of Arts

Infant-Directed Speech and Children's Repetition
By Kathryn Rollins
Depts. of Linguistics and Psychology, Faculty of Arts

Indigenous Children's Artworks from Residential Schools
By Adrienne Sande
Faculty of Education

Evenhand Co-Ordination: Differential Effects of Salient Obstacles in Visually-Guided Grasping
By Aneet Saran
Dept. of Psychology, Faculty of Arts

Adaptive Management and the Environment Video Project
By Emily Thoroski
Dept. of Environment and Geography, Clayton H. Riddell Faculty of Environment, Earth, and Resources