

Page numbers refer to original page numbers, not new ones, for clarity. Additions to the text are underlined.

## Chapter One

### Typing errors

- Pg. 2- behavioural-altering changed to behaviour-altering
- Pg. 8- per capita is italicized

### Textual Changes

- Pg. 3- Included sentences on the impact of the parasite on the definitive host.
- "The parasite is known to have a comparably small impact on the definitive host compared to the intermediate host (Nicholas and Hynes, 1958), occasionally forming small intestinal cysts. It has been suggested that the parasite may play a role in mortality when hosts are initially of poor body condition (Itämies et al. 1980)."
- Pg. 5- Manipulative activity is defined in text.
  - "The manipulative activity of *P. minutus*, essentially the ability of the parasite to increase host risk-taking, is sensitive to environmental factors (Perrot-minnot et al. 2016), with the oxygenation of the environment influencing the parasite's ability to alter behaviour."

## Chapter two

### Typing errors

- Pg. 13- added parenthesis after Fig 1.1
- Pg. 22- italicized in-situ

### Textual Changes

- Pg. 13- Included additional information on the selection of alder leaves for the trial
  - "For feeding trials, alder (*Alnus glutinosa*) leaves were cut into 2.5 cm discs that were dried at 37°C for 12 hours, weighed and then conditioned in water from Lough Ennell for three days to enhance palatability. Alder leaves were selected due to the demonstrated preference of amphipods for alder leaves over other leaf types (Agatz and Brown 2014) and the known location of alder trees near lake margins. Leaf material was presented as the sole food source in accordance with standard methods (Agatz and Brown 2014)."
- Pg. 16- randomization is now described in the text
  - "Gammarids were exposed to temperatures randomly, and within temperatures amphipods were haphazardly selected for trial orders."
- Pg 17- added text about survival rates
  - "There was no clear pattern within survival rates in this experiment (Fig. 2.1f)."
- Pg. 24- Included additional detail on potential future work
  - "Further work on the interactions between temperature and parasitic infection in additional model systems, particularly those that involve behaviour-modification in intermediate hosts, are needed to examine the generality of our results and explore further the potential impacts of warming on predator-prey interactions mediated by behaviour. Specifically, meta-analyses of the impact of acanthocephalans on the behaviour of their intermediate hosts across multiple host populations could reveal the generality of these findings. Additional experiments tracking intermediate host behaviour in the field would also determine the overall importance of this altered behaviour in real ecosystems."

### Figure & Table Changes

- Figure 2.1
  - Added 2.1.f. Survival rates of infected and uninfected individuals
  - Overall structure altered to make a one column 6 row figure.
  - Jittered points to clarify values
  - Relabelled axes to clarify
  - Legend changed to:
    - Variation in rates (mean  $\pm$  S.E.) of (a) respiration, (b) efficiency, (c) consumption, (d) growth rate, (e) assimilation, and (f) survival of *G. duebeni* individuals infected (open circles) and uninfected (closed circles) with *P. minutus*.
- Figure 2.2
  - Added final sample size label to each point
  - Overall scaling altered to make figures more square
  - Legend changed to :
    - “Variation in (mean  $\pm$  S.E.) the (a) phototactic and (b) geotactic behaviour of *G. duebeni* individuals infected (open circles, dotted lines) and uninfected (closed circles, solid lines) with *P. minutus*. Relationships are shown as least-squares regression  $\pm$  95% C.I. Points are labelled with sample size.”
- Table 2.1
  - Restructured so order follows figure 2.1

## Chapter Three

### Typing errors

- Pg. 30- changed our to my
- Pg. 30- changed driving to drives

### Textual Changes

- Pg. 29- added text to reference effect size analysis.
  - “Combined effects of parasitic infection and warming were, however, additive, *as temperature did not interact with parasitic infection in moderating bioturbation, and the magnitude of the effect of parasitism was consistent across the range of temperatures examined (Fig. 3.1.b.).*
- Pg. 30- Included additional detail on potential future work
  - “However, further work is needed to determine whether or not enhanced bioturbation activity is adaptive for the parasite, *and could be completed using experimental mesocosms which have predator mimics such as those designed by Demandt et al. (2018).*”

### Figure & Table Changes

- Initial Figure 3.1
  - Changed 3.2.a. to means with SE.
  - Altered y axis to be log of Area Reworked.
  - Jittered points across x axis
  - Added final sample size above each point in 3.2.a.
  - Added Cohen's d effect size plot as plot 3.2.b.
  - Legend changed to :

- *“(a) Rates of bioturbation (mean±SE) by G. duebeni infected (open circles) and uninfected (closed circles) with P. minutus across the temperature range. Bioturbation was measured as the area of benthic surface sediments in our experimental microcosms that were reworked over the course of the experiment. Final sample size is indicated above each data point. (b) Effect size of P. minutus infection on bioturbation rates across the range of temperatures examined.”*
- Figure 3.1
  - Added Figure to clarify process of analysis
    - *“The image processing workflow: (a) the image is selected from its background, then (b) the red channel has been selected after splitting the image, and finally (c) the image is thresholded, with only black pixels (representing the sediment brought up by the amphipod) and white pixels (representing the fluorophores) remaining.”*

## Chapter Four

### Typing errors

- Pg. 33- changed “warming climate change” to “warming climate”

### Textual changes

- Pg. 35 – feeding preference item choices were clarified
  - *“Three items were selected for feeding preference trials. Alder leaves (Alnus glutinosa) were selected due to the demonstrated preference of amphipods for alder leaves over other leaf types (Agatz and Brown 2014) as well as their use in standard methodologies (Little and Altermatt 2018). Alder leaves were cut into 0.7 mm discs and conditioned for 72 hours in Lough Lene water to improve palatability. A. aquaticus were selected as a potential prey item, as it has been shown that isopods are important prey for amphipods in lake ecosystems (Macneil et al 1997). Finally, juvenile amphipods were presented as a food item, as cannibalism is known to be commonplace in gammarid amphipods (Dick et al. 1993). Potential prey items --- A. aquaticus and juvenile G. duebeni --- were weighed individually before being presented live for predation trials. For scavenging trials, prey items were euthanized by freezing and were defrosted fully before use.”*
- Pg. 36- randomization is now described in the text
  - *“Gammarids were exposed to temperatures randomly, and within temperatures amphipods were haphazardly selected for trial orders.”*
- Pg. 42- additional clarification provided about prey item switching.
  - *“Finally, the proportion of individuals switching prey items between initial pursuit and actual capture was also influenced by the status of the potential prey, with significantly more adults switching items when potential prey were alive than when they were not (Table 4.1f). The majority of amphipods presented with live prey switched from initially pursuing isopods or juveniles before capturing and subjugating leaf material. Neither temperature nor parasitic infection had any effect on choice of prey.”*
- Pg. 45- Included additional detail on potential future work
  - *“and further experimental work exploring the generality of the impact of parasites on handling time and feeding preference is needed. Additional tracking studies on*

*parasitised and non-parasitised omnivores would help determine the specificity of these findings. Functional feeding curves constructed with the potential prey items used in this study could also reveal the generality of the conclusions.”*

### Figure & Table Changes

- Figure 4.2
  - Sample numbers included over bars
  - Labels along the bottom altered to improve readability
  - Legend on the figure removed, information included in text legend
  - Colours altered to allow easy reading of text labels with sample sizes
- Figure 4.4
  - Added sample sizes to bars
  - Altered text size to improve readability
  - Altered legend accordingly
    - *Proportional predator preferences while potential prey items were alive (predating) or dead (scavenging). The proportion of times each potential prey item was initially (a) pursued, (b) captured, and (c) subjugated by amphipod individuals. Numbers within bars are the number of individual trials represented by each bar.*
- Figure 4.3
  - Added labels with sample size of each data point

## Chapter Five

### Typing errors

- Pg. 48- Added “to” in “needed to improve the predictive”
- Pg. 49- Added a comma to the gps coordinates of the sites
- Pg. 51- added comma in (Fig. 2a,b).
- Pg. 51- changed densities to density in “there were three levels of amphipod density”

### Textual Edits

- Pg.49- Background data
  - Added additional information on the characteristics of the warmed and ambient reaches.
- Pg. 51- Included additional information on the selection of horse chestnut leaves for the trial
  - *“...each containing 7 g of dried horse chestnut (*Aesculus hippocastanum*) leaves (Agatz and Brown 2014). Horse chestnut leaves were selected due to the abundance of horse chestnut trees near the site and the known palatability of horse chestnut leaves to amphipods (Agatz and Brown 2014).”*

### Figures and Tables

- Added appendix of coefficients from linear models (Appendix C)
- Figure 5.3
  - Altered legend on part 5.b. to increase clarity
- Figure 5.4
  - Altered legend to make clear the data were from winter trials only.

## Chapter Six

### *Typing errors*

- Pg. 64- changed “on the” to “of the”

### *Textual Changes*

- N/A

### *Figures and Tables*

- N/A

## Sources

### *Typing errors*

- Pg. 69- Italicized species names in Dick et al. 1993

### *Additional Sources*

- Itämies et al. 1980 reference
- Nicholas and Hynes 1958 reference