Host heterogeneity in *Tribolium castaneum* infected with a gut parasite

Jacob A. Cohen[1], Mark E. Viney[1], Andy Fenton[1]

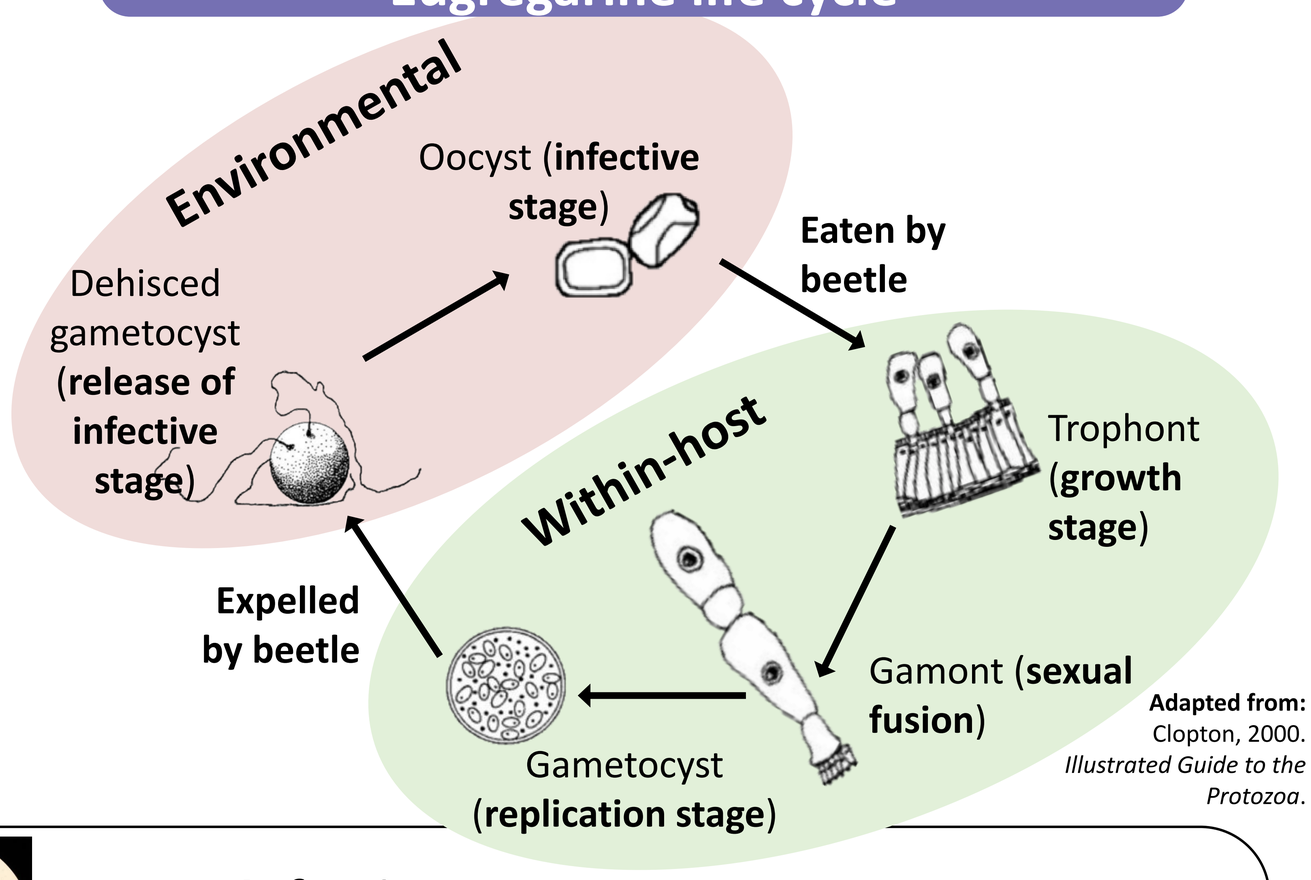
[1]Department of Evolution, Ecology and Behaviour, University of Liverpool

jacob.cohen@liverpool.ac.uk

Introduction

- How does host heterogeneity in **susceptibility** and **infectiousness** affect parasite transmission?
- The red flour beetle (*Tribolium castaneum*) is parasitized by eugregarine gut parasites and is ideal for testing this question:
  - Beetles are infected with the eugregarine with relative ease; and
  - Our lab population of beetles is made up of six separate colonies established from wild populations collected from different locations.
- Specific aim: testing whether the colonies differ in their **susceptibility** and **infectiousness** with respect to the eugregarines.

Eugregarine life cycle



Adapted from: Clopton, 2000. *Illustrated Guide to the Protozoa*.

Methods

Susceptibility assay

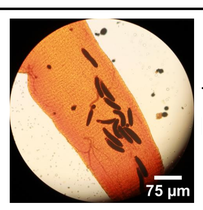
Day 0
Larvae placed on parasite-contaminated flour.

Days 4-7
24 larvae per day placed into individual wells of 96-well plate for 48 hours.

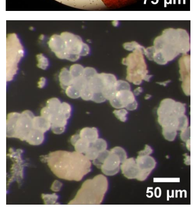
Egg collection.

Day 1
Larvae placed on clean flour.

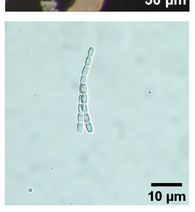
Days 6-9
24 larvae dissected, number of visible parasites counted.



Trophonts in larval gut.



Gametocysts in larval frass.



Oocyst chain.

Infectiousness assay

Day 0
Larvae placed on parasite-contaminated flour.

Days 8-11
48 larvae per day placed into individual wells of 96-well plate for 48 hours.

Egg collection.

Day 1
Larvae placed on clean flour.

Days 9-12
Larval frass checked for gametocysts.

Days 10-13
Oocysts counted using a haemocytometer.

Results, susceptibility assay

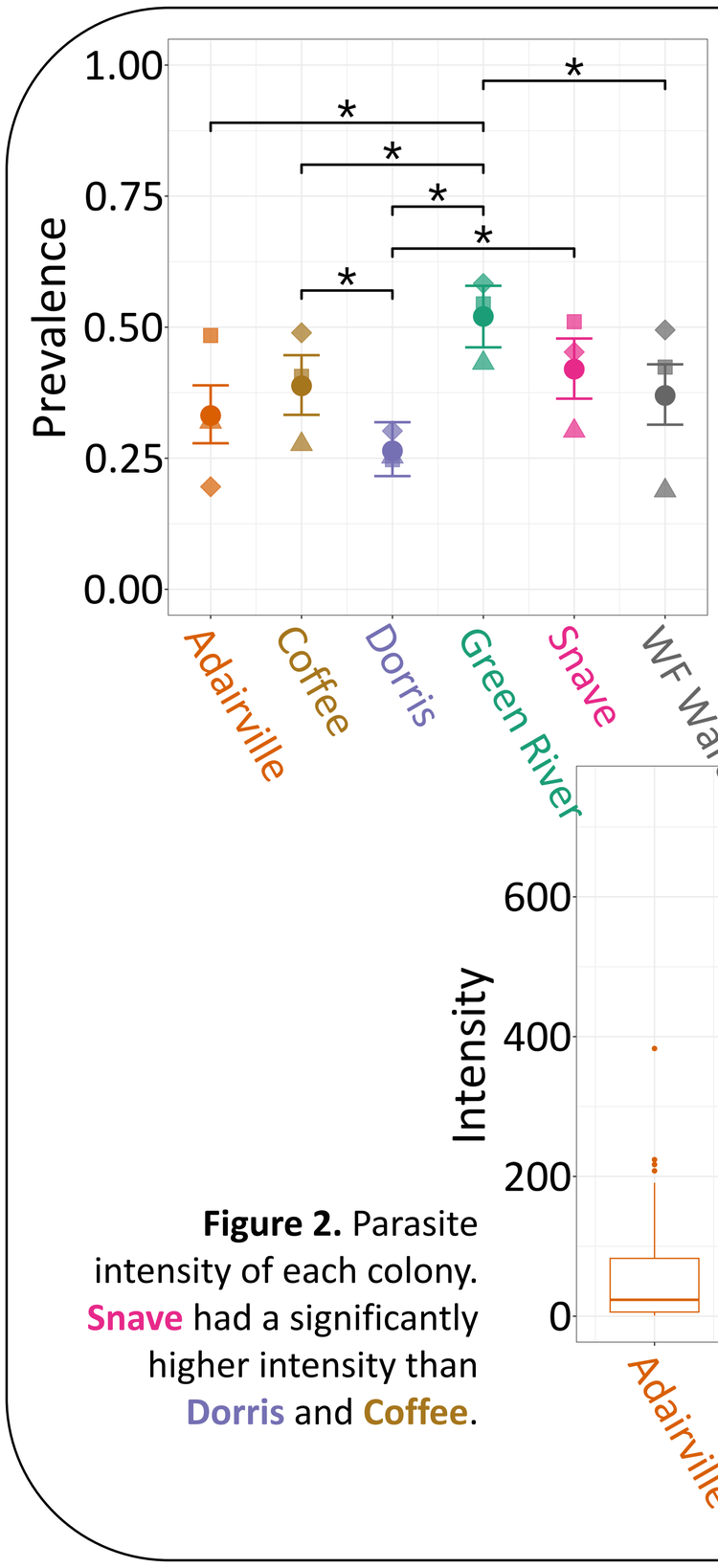


Figure 1. Parasite prevalence of each colony. The circular points show the overall prevalence over the three replicates. Significant differences between the colonies are denoted by asterisks.

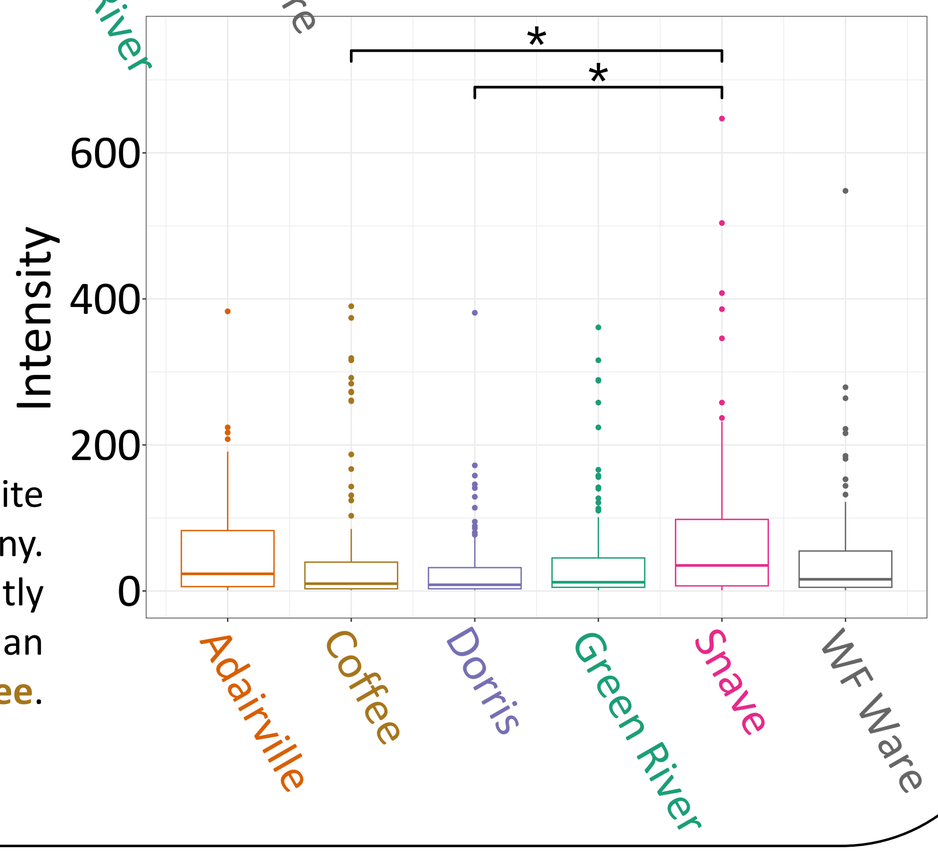


Figure 2. Parasite intensity of each colony. **Snave** had a significantly higher intensity than **Dorris** and **Coffee**.

Results, infectiousness assay

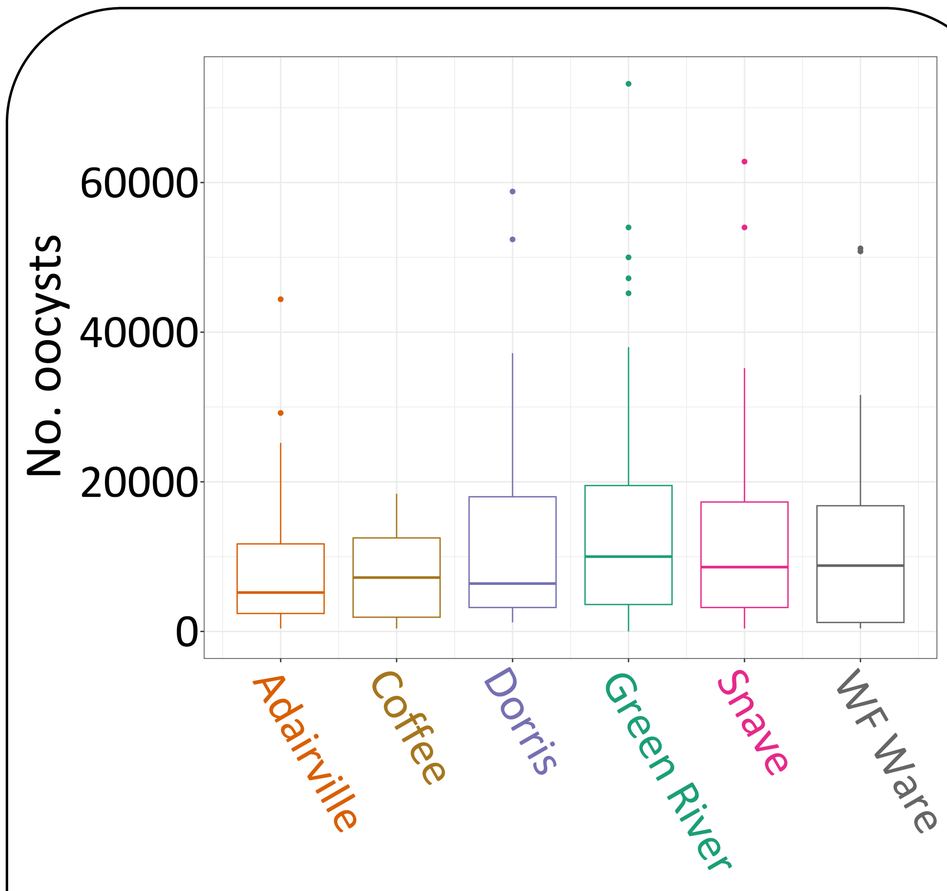


Figure 3. Oocyst counts of each colony. There were no significant differences between colonies.

Conclusions & next steps

- Colonies show differences in susceptibility, but not infectiousness.
- **Snave** and **Dorris** are significantly different for both prevalence and intensity.
- The heterogeneity in susceptibility allows us to combine individuals from the two colonies at different proportions to test how parasite transmission changes as host heterogeneity levels are manipulated.

Acknowledgements

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