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Gregarine Parasites in Zygoptera of Keith County, NE

Anisha Kadubandi
University of Nebraska-Lincoln, anishakadubandi@gmail.com

B. Gage Kircher II
University of Nebraska-Lincoln, bgagekircher@gmail.com

Scott L. Gardner
University of Nebraska-Lincoln, slg@unl.edu

Gregarine Parasites in Zygoptera of Keith County, NE

A Study by Anisha Kadubandi and Gage Kircher

Damselflies

- Taxonomy: Part of the Odonata order & Zygoptera suborder
- Earliest existing aerial insects
- Freshwater– midges, ants, flies
- Ecologically beneficial: agricultural pest control, disease vectors
- Bio-Indicator/water quality

Background

The objective of this study was to determine the relationship between damselfly mass/gregarine intensity, gregarine length & damselfly mass. Prevalence in still water vs. running water.

Four locations: Cedar Creek, Platte Rapids, Dunwoody Pond, Lake Ogallala CPBS (still & running water)

Measured the following variables: sex, species, mass of damselfly, gregarine prevalence, intensity, length and presence of parasites/oocysts

Hetaerina americana

Enallagma civile

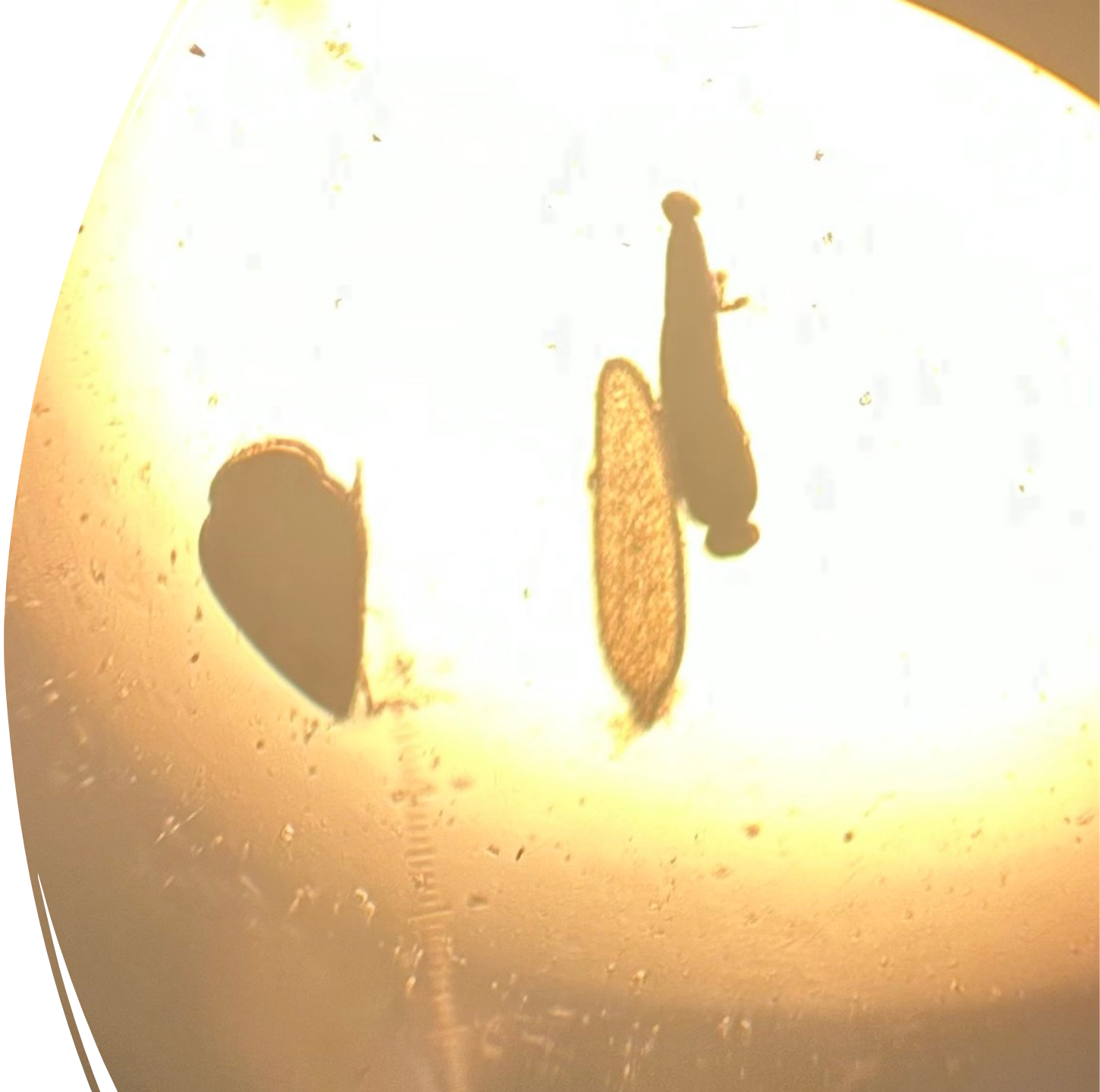
Ischnura verticalis

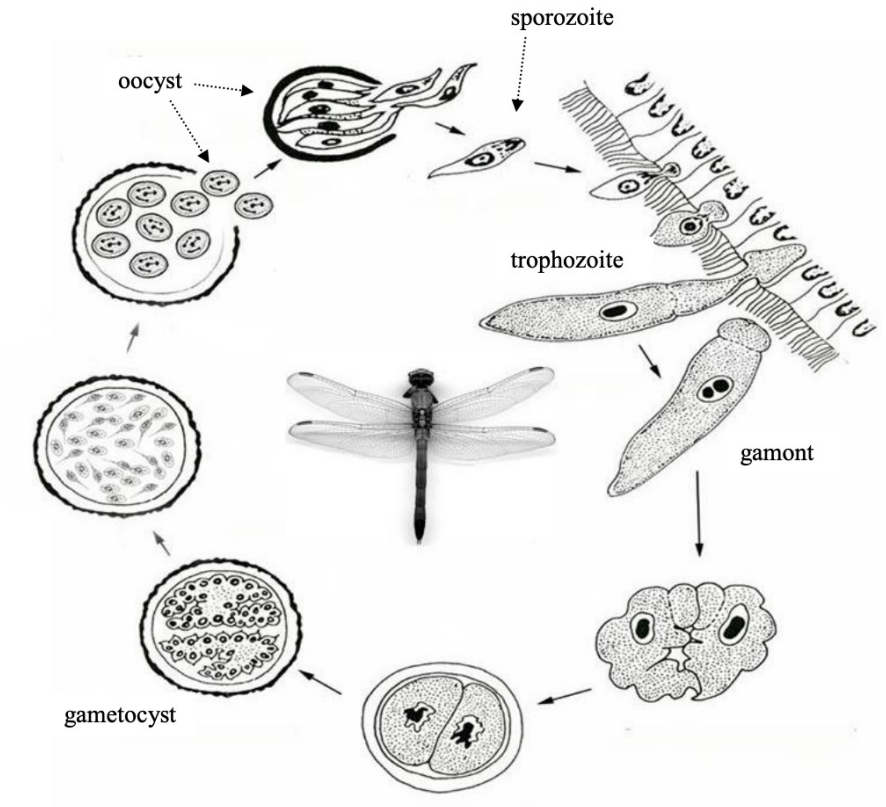
Nehalennia irene

Enallagma vesperum

Gregarines (Apicomplexa: Eugregarinidae)

- gut protozoans
- part of the phylum Apicomplexa
- opaque and white in color
- Main body features: epimerite, protomerite



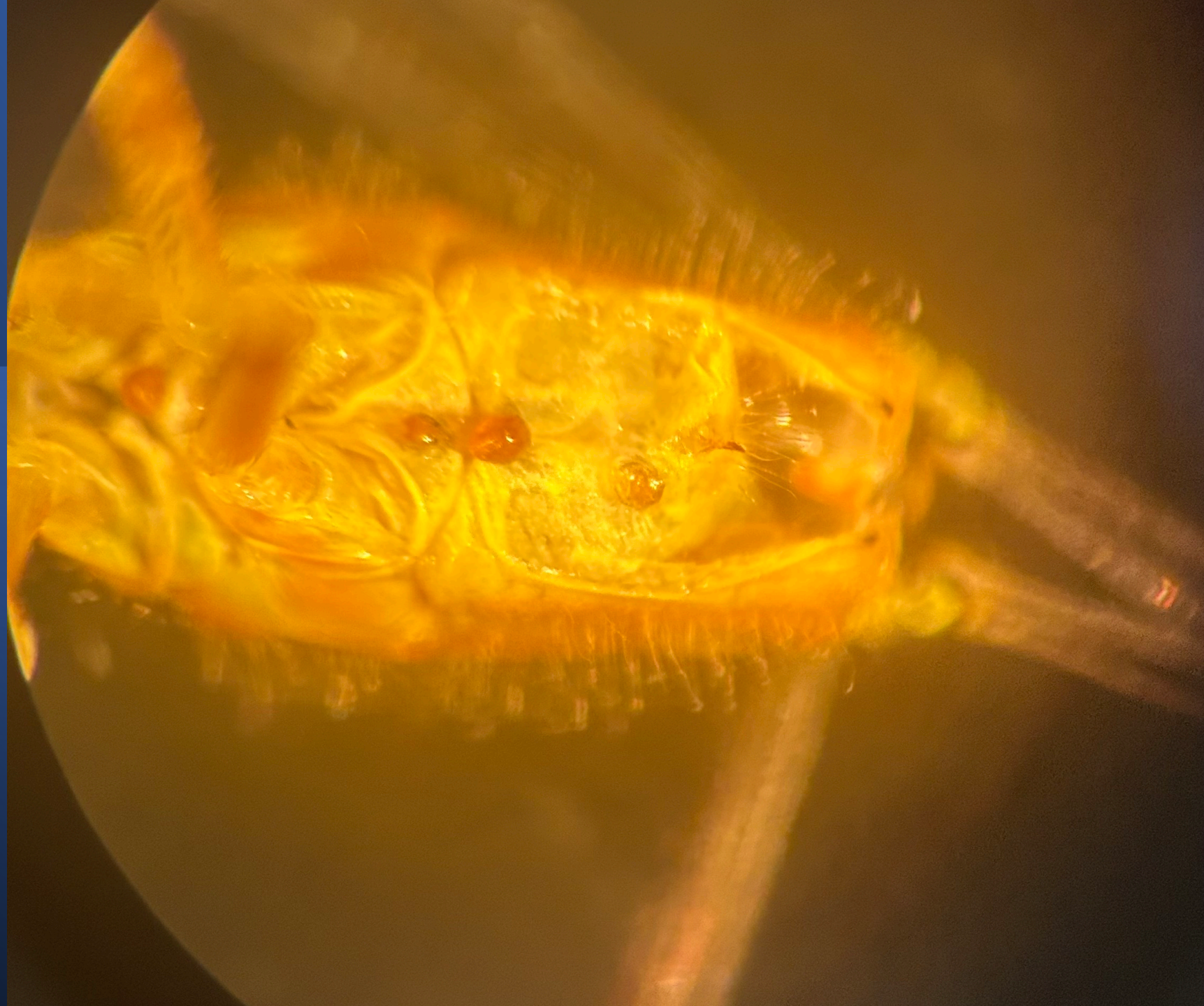


(Jason Locklin, 2010)

Methods & Materials

Damselfly Intestine

Mites



Trematodes - Haematoloechus

Infection

Gregarine Species Present

- *Nubenocephalus nebraskensis,*
- *Actinocephalus carrilynnae,*
- *Hoplorhunchus acanthatholius,*
- *Steganorhynchus dunwoodyi* (Cook TJP, et al, 2001).

Results

	Dunwoody Pond	Cedar Creek	Platte Rapids	Lake Ogallala
Overall Prevalence	46%	15.9%	29%	43%
Avg. Gregarine Intensity	10.9 greg.	36.5 greg	9.3 greg	9.9 greg.
Avg. Gregarine Length	92.7 um	102.8 um	75.4 um	58.6 um

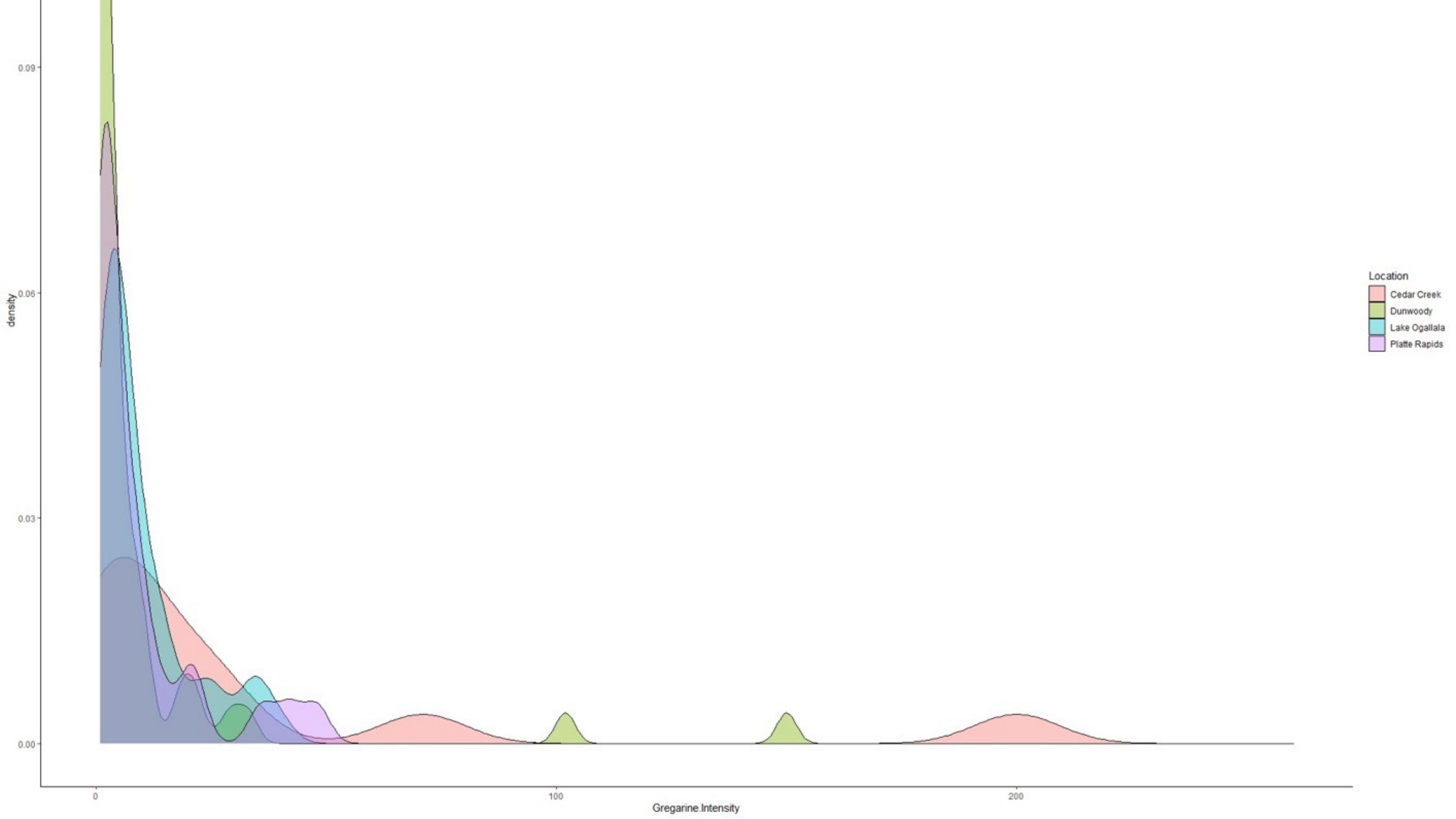
- T-test Intensity in Still vs. Moving Water

  P value: 0.4553

  DF: 2

- T-test Gregarine Prevalence in Still vs. Moving Water

  P value: 0.0817


0.09
0.06
0.03
0.00
density
0
100
200
Gregarine.Intensity
Location
Cedar Creek
Dunwoody
Lake Ogallala
Platte Rapids

ANOVA Results

- ANOVA Differences in Gregarine Intensity between

Locations:

F value: 0.579

P value 0.629

Degrees of Freedom: 3

ANOVA Results

- ANOVA for Gregarine Intensity and Length:

  F value: 6,458

  P value: 3.49 E -7 = 0.000000349

  DF: 1

  Significant****

ANOVA Results

- ANOVA Differences in Damselfly Mass and Gregarine Intensity

  F value: 3.229

  P value: 0.0732

  DF: 1

Implications

- The most interesting observation made during our study was the complete lack of parasites found within *H. americana.*
- The results of our t-test statistical analysis suggest that there may be a relationship between the water environments sampled and gregarine prevalence.
- The results of our ANOVA statistical analysis indicate a greater intensity of infection is associated with longer gregarines.

Sources of Error

- Many individuals involved in dissections-- cannot ensure consistent protocol
- Did not attain 100 damselflies from Cedar Creek
- Dissection within 12 hours of capture to avoid abdomen decay

Future Directions

- Coevolution of the gregarine and the damselfly
- Larger samples sizes from collection sites
- Investigating the lack of parasites within *H. americana*
- Surveying gregarine species present
- Comparing species of damselflies directly
- Additional sample sites

Literature Cited

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PREVALENCE OF GREGARINE PROTOZOA INFECTION IN ZYGOPTERA SOURCED FROM VARYING COLLECTION SITES IN KEITH COUNTY, NEBRASKA

B.G Kircher II, A. Kadubandi, and S.L. Gardner S. H.W. Manter Laboratory of Parasitology, University of Nebraska-Lincoln and Cedar Point Biological Station, University of Nebraska-Lincoln.

Damselflies are ubiquitous flying insects of the order Odonata with thousands of species found around the world. The parasites associated with damselfly species are equally as ubiquitous, with the most common being gregarine protozoa and water mites, though other parasitic organisms such as trematodes are also found in these animals. Gaining an understanding of the relationships among hosts and their parasites within an environment can grant greater insight into the overall health and levels of biodiversity present in local environments. In this study, several species of damselfly, largely consisting of the species *Hetaerina americana, Enallagma civile,* and *Nehallenia irene* were surveyed from four collecting sites to answer several questions surrounding the relationship among parasites and damselfly species. Samples were accumulated from several sites and their gregarine parasites measured to explore the diversity in the area. Prevalence counts were taken for other parasites affecting damselflies, specifically water mites and trematodes. Additionally, of the four collection localities, two were chosen that featured flowing water, and two sporting stagnant water, to determine if moving water environments differ significantly from non-flowing environments in parasite prevalence or intensity of infection. Ultimately the results of this study fail to reject the hypothesis that larger damselfly hosts tend to have larger gregarine parasites, and that more severe gregarine infections (higher parasite burden) tend to feature gregarines that have larger body sizes. Additionally, the results of this study raise interesting questions requiring further investigation, such as the complete lack of parasites in *H. americana* from a site that showed high levels of parasitism in other damselfly species.