

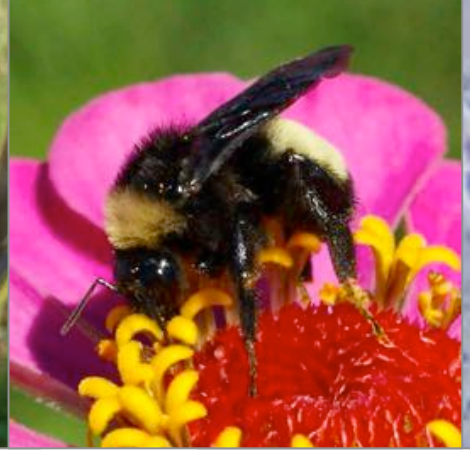
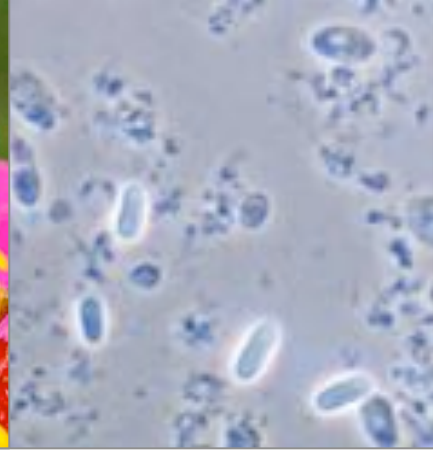

Does presence of parasites contribute to Virginia bee decline?

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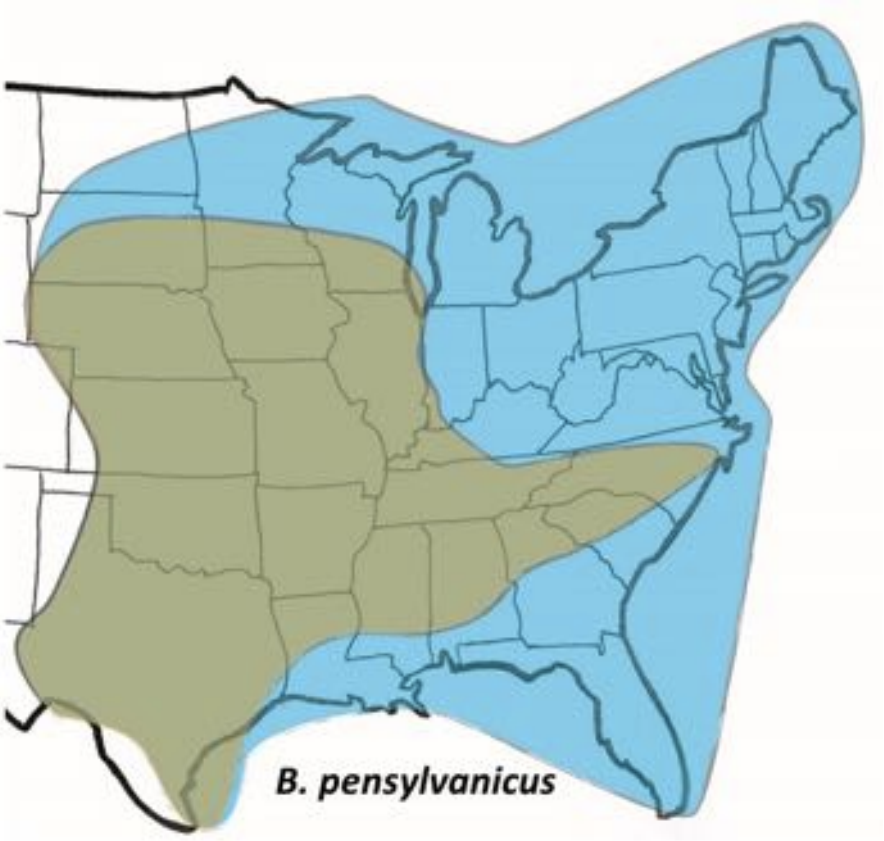
Smithsonian Conservation Biology Institute

There are species of bumblebees experiencing serious declines



Map adapted from Cameron et al. 2011

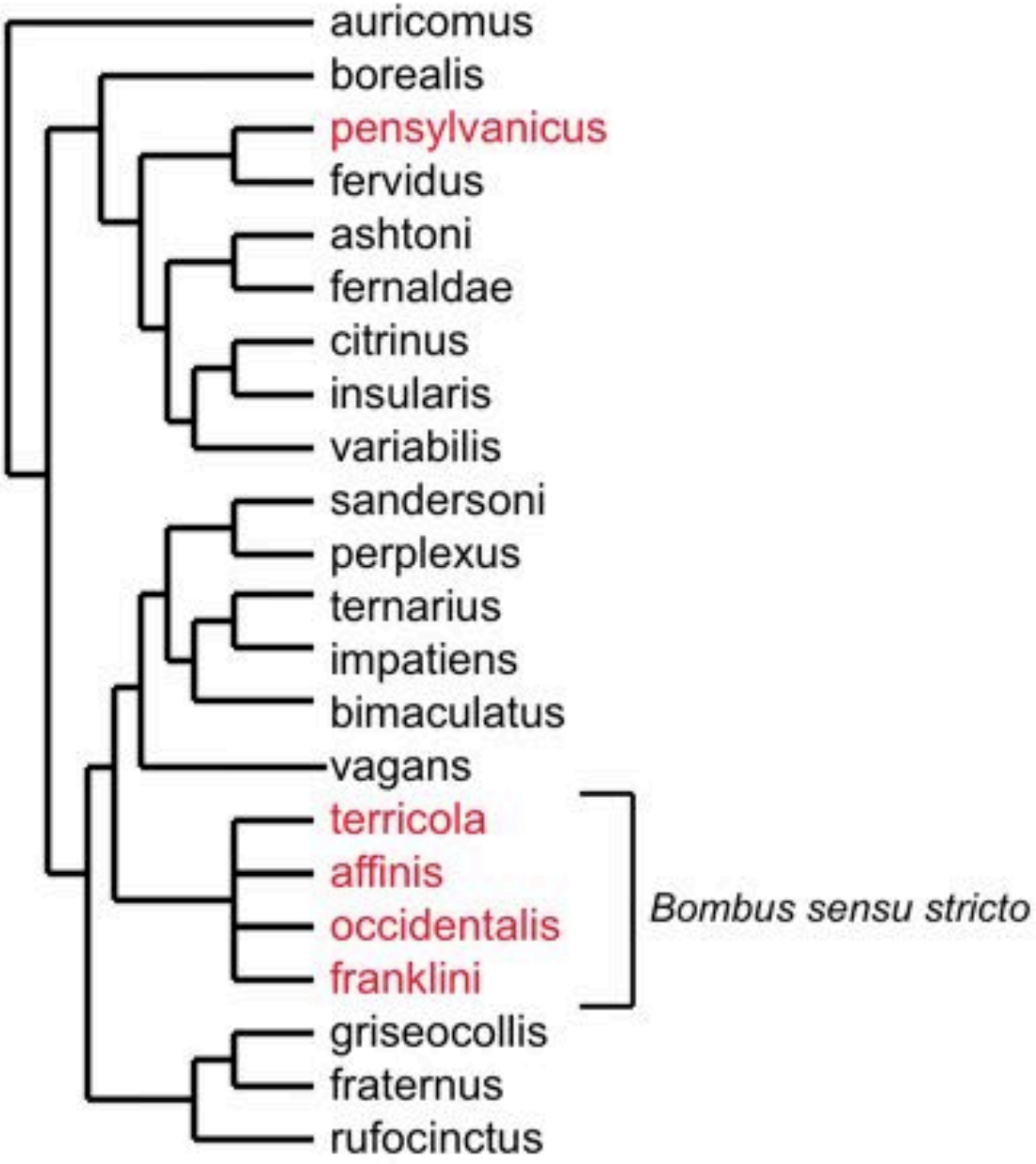
B. occidentalis

B. pensylvanicus

B. affinis

B. terricola

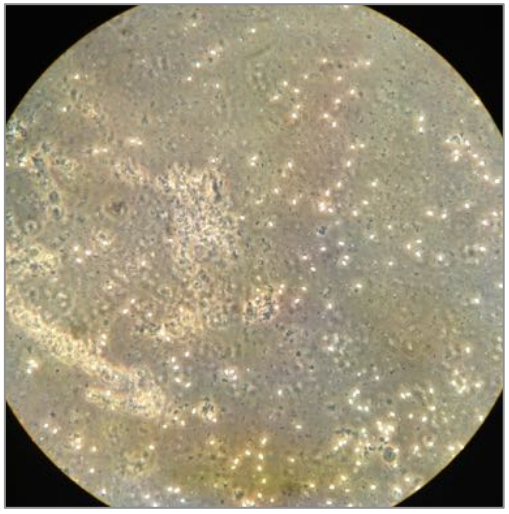
Relatedness of declining species



Crithidia bombi

- Trypanosome
- Inhibited colony founding
- Reduced colony sizes
- Non-lethal effects on workers

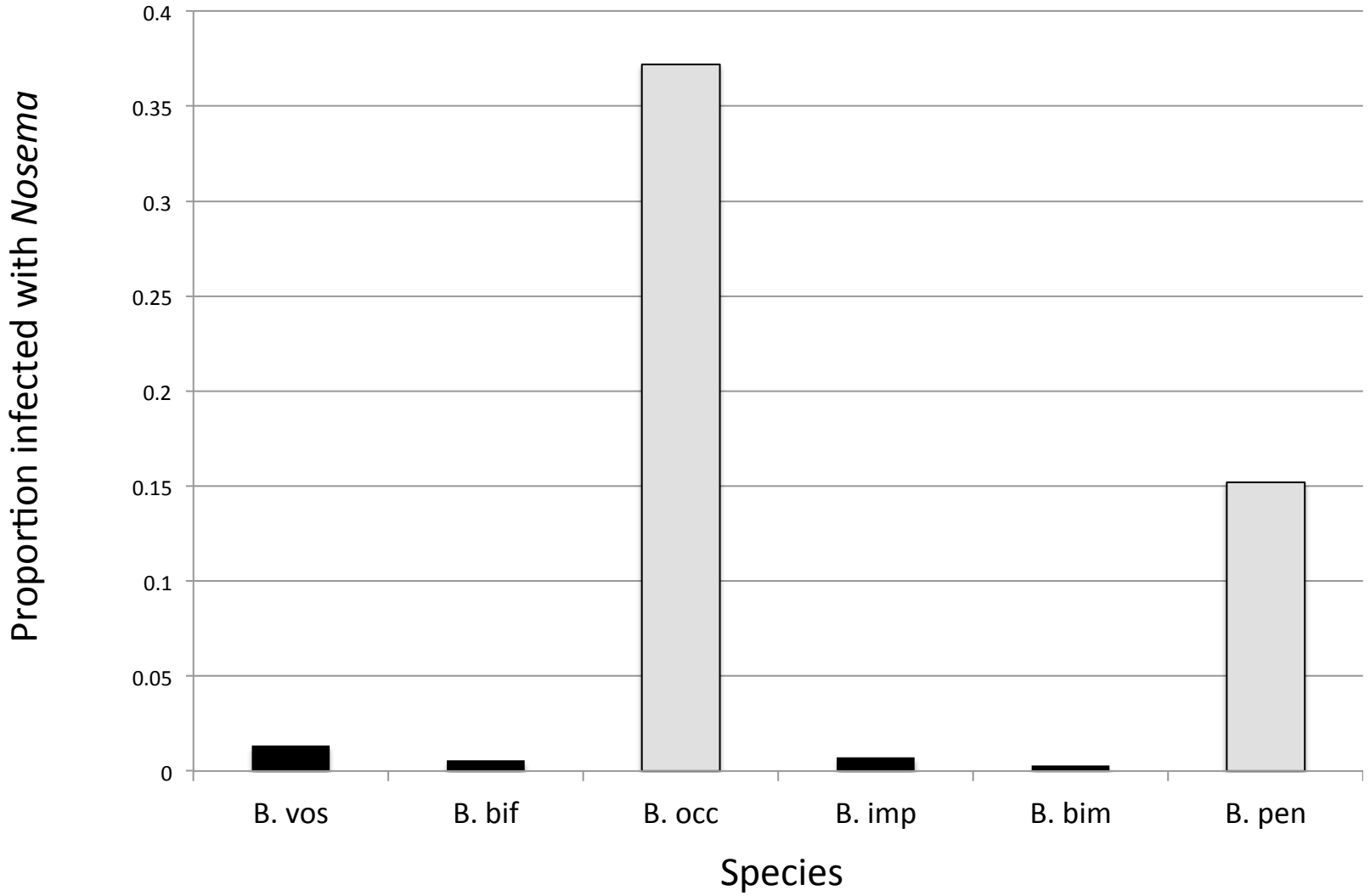
Nosema bombi



- Microsporidian (Kingdom: Fungi)
- Queens stop mating
- New queens have lowered colony founding success
- Crippled males
- Higher mortality
- Delayed worker production
- Non-lethal effects on workers

Brown et al., 2003; Gegear et al., 2006Velthuis & van Doorn, 2006; Otti & Schmid-Hempel 2007 & 2008, Rutrecht & Brown, 2009

Nosema Infection Prevalence across Species



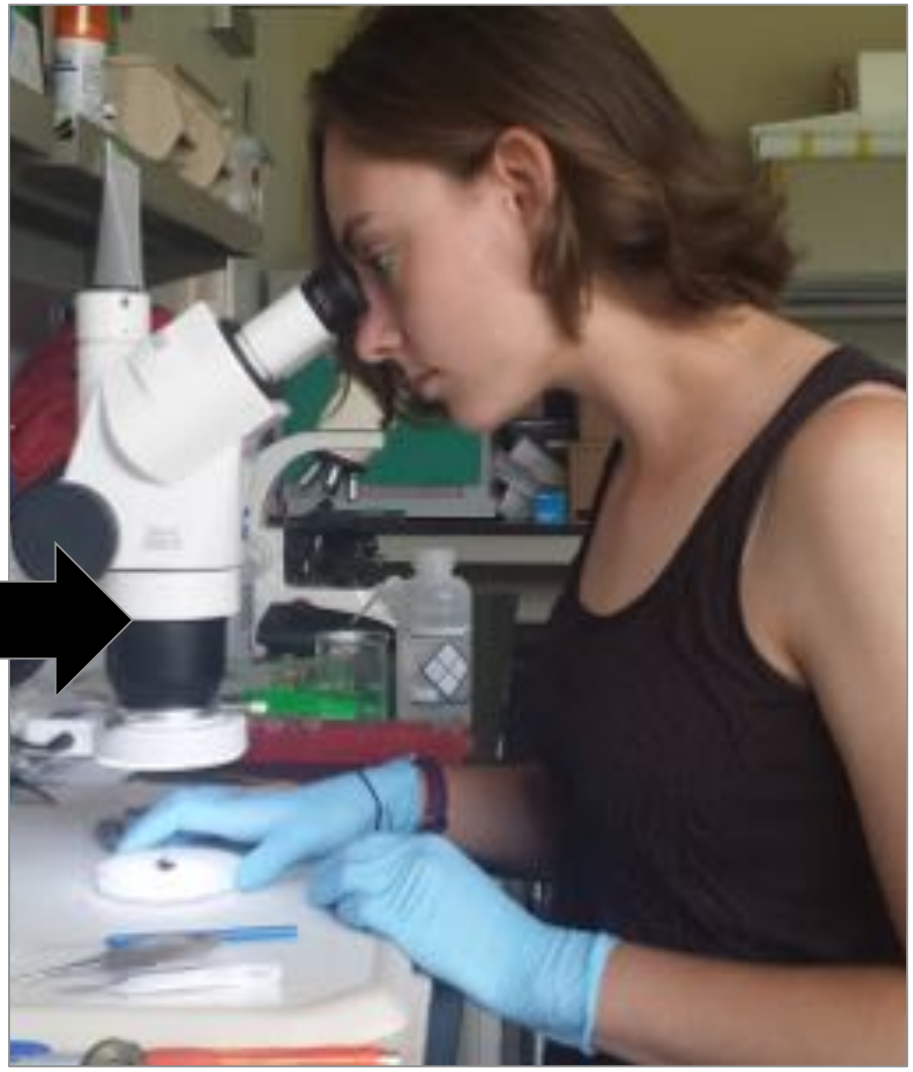
Based on Cameron et al. 2011

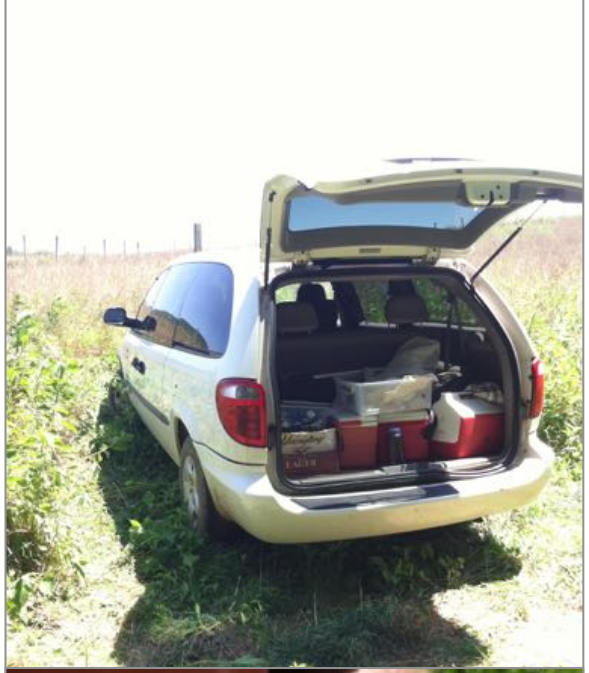
Hypotheses

1. **Declining species** have a **higher incidence of disease** than common species at sites where they co-occur.

2. **Declining species occur** primarily at sites where the incidence of ***Nosema*** and ***Crithidia*** is **low**.

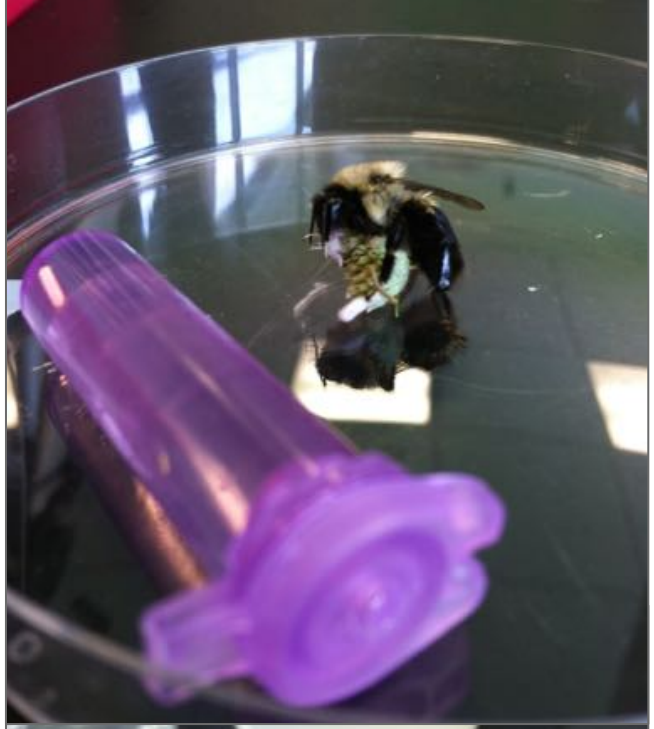
The Project

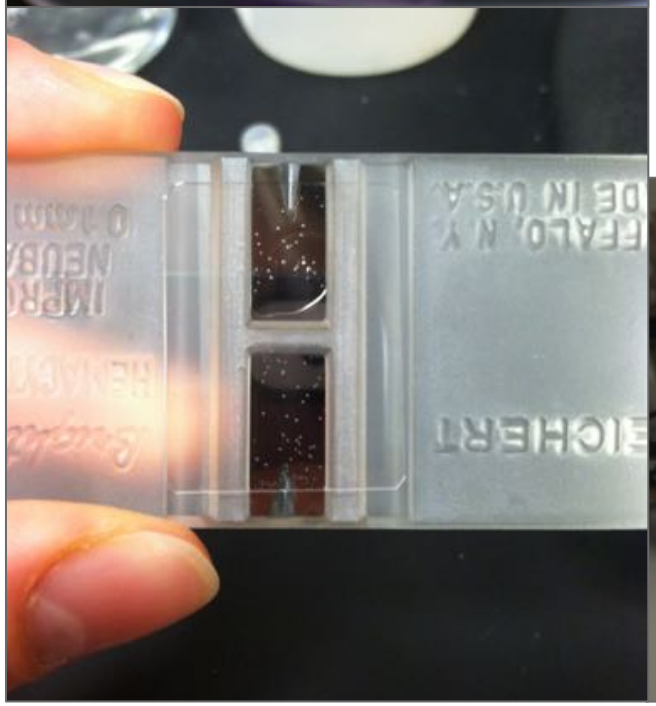




Methods: Field Work

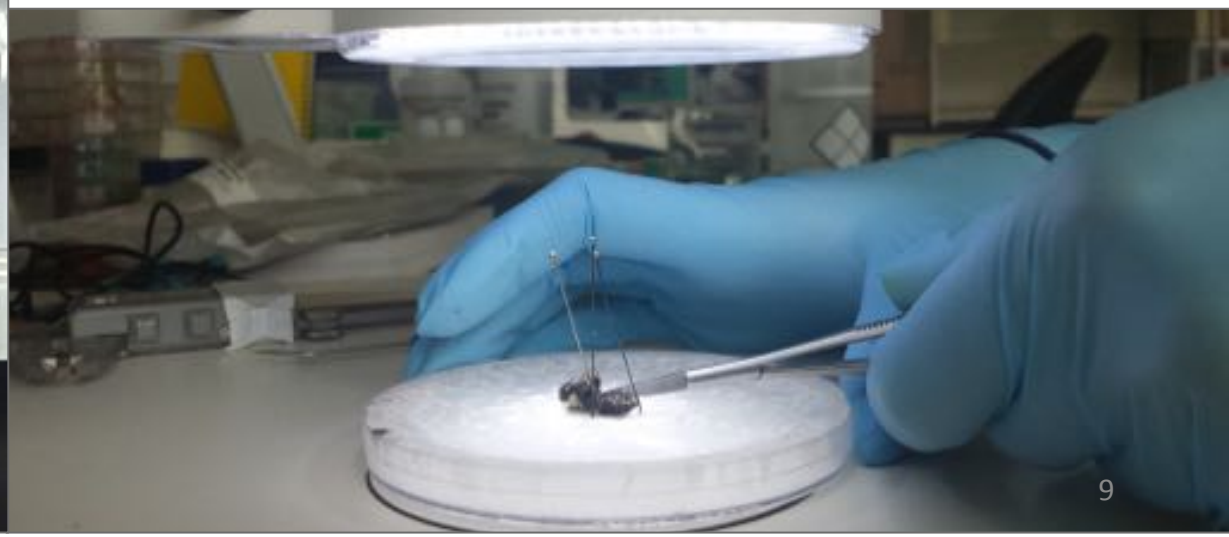
- 12 old field and wildflower meadow sites
- 6 species
- 25 individuals per species



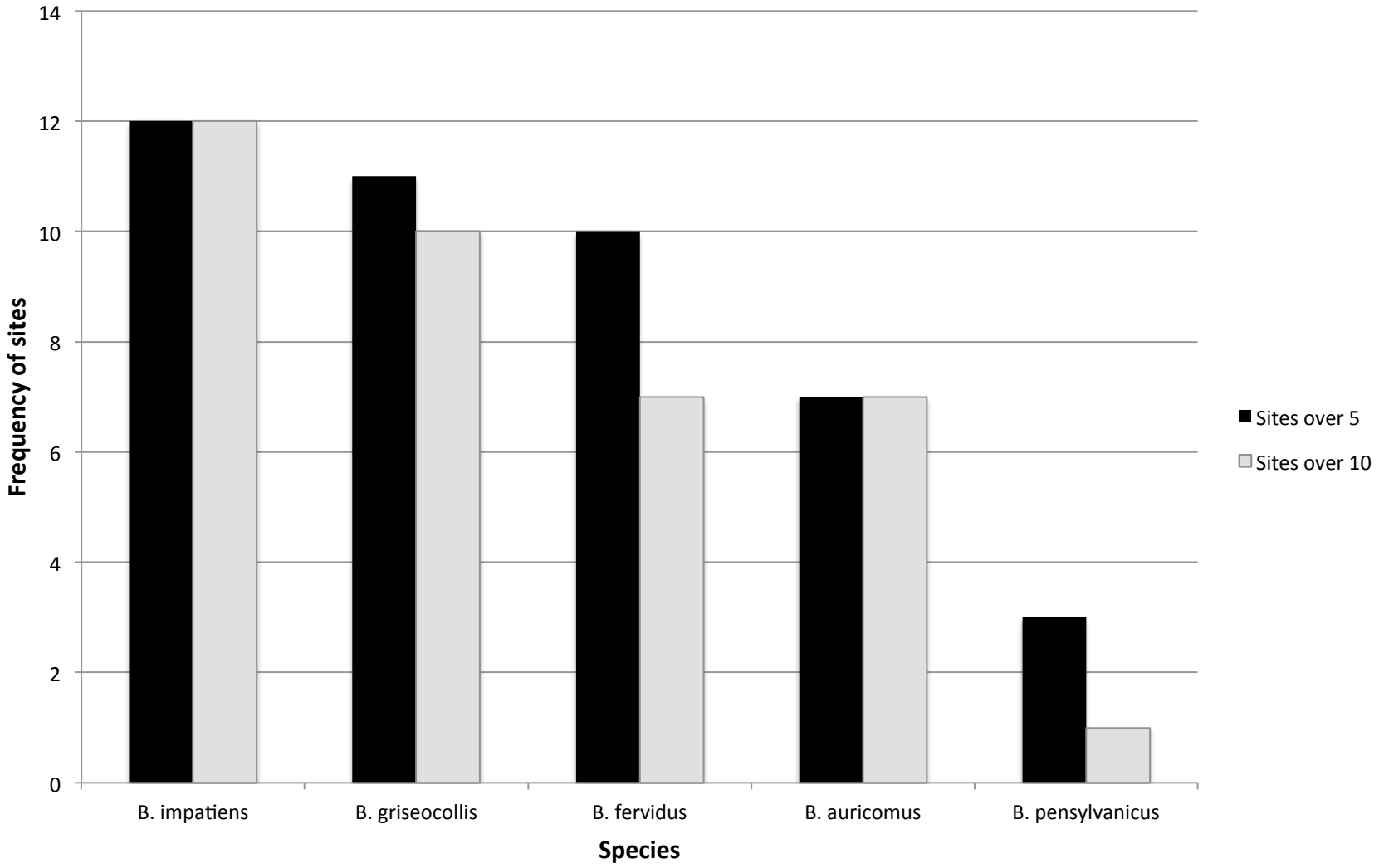


Methods: Lab Work

- Housed bumblebees in individual containers with food
- Took fecal and tarsal samples
- Euthanized bees (deep freeze)
- Analyzed samples



Results: Individuals Collected

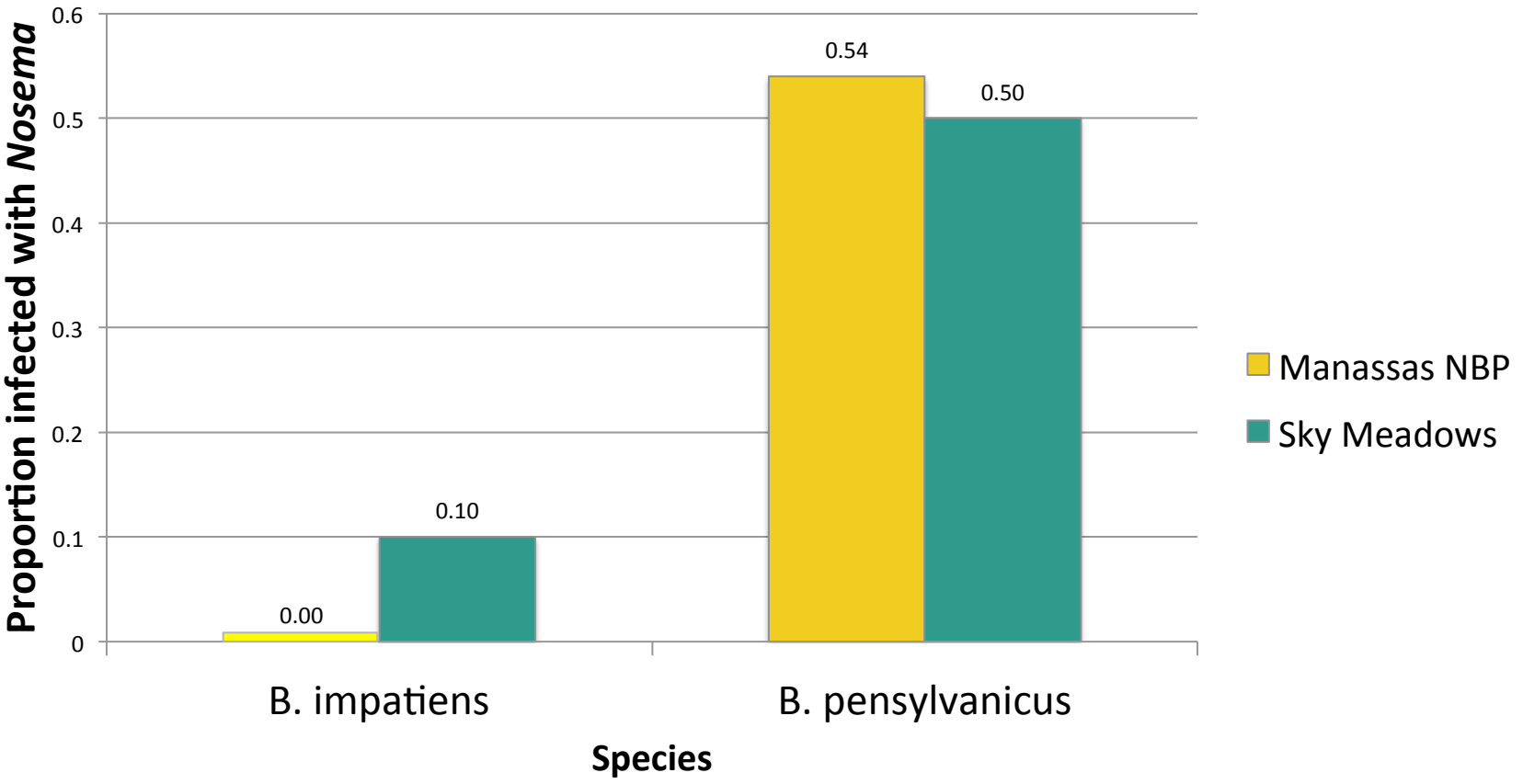


Results: Crithidia levels

Crithidia infection rates **did not differ** between species (p= 0.298) or sites (p = 0.559).

Overall infection rates were **60-80%** of individuals per species and per site.

Results: Nosema levels



Significant effect (species) for *Nosema* infection levels ($p < 0.001$)

Looking Ahead

This coming year: bolstering our sample size to enhance our *Nosema* infection model

Genetic analysis to come!

Future work on other factors

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Questions?