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Effects of olfactory cues on the foraging behavior of a Carabid beetle, *Calosoma wilcoxi*, a predator of a forest defoliator.

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Background

- Arthropod predators often use environmental cues such as kairomones to locate herbivore prey.
- Several species have been shown to be attracted to volatiles emitted by herbivore host plants, as well as olfactory cues produced by the herbivore.
- *Calosoma wilcoxi* is a voracious predator that specializes on lepidopteran larvae often found in the forest canopy, showing a preference for the fall cankerworm (FCW).
- It is unknown whether *C. wilcoxi* uses olfactory cues associated with prey or their host plants to locate foraging sites.



Objectives & Hypothesis

- Used FCW frass, caterpillars, damaged oak leaves, and conspecifics to determine if *C. wilcoxi* uses olfaction to locate prey.
- We expect that *C. wilcoxi* can detect cues associated with FCW and a preferred host, white oak. Likewise, we expect *C. wilcoxi* to detect conspecifics.

Methods



- Y-tube olfactometer offered a choice between cue and a control (odorless air).
- Ran trials for each experiment until choice made or 5 minutes passed.
- Recorded choice and time spent in each arm of the Y-tube.
- Analyzed choice data using exact binomial test.
- Analyzed time spent in each arm using paired t-test.

Results

We ran 45 frass trials (7 treatment, 10 control, 28 no choice), 51 damaged leaf trials (11 treatment, 8 control, 32 no choice), 50 caterpillar trials (14 treatment, 8 control, 28 no choice), and 46 female trials (7 treatment, 8 control, 31 no choice). Only males were used to test for detection in the female experiment.

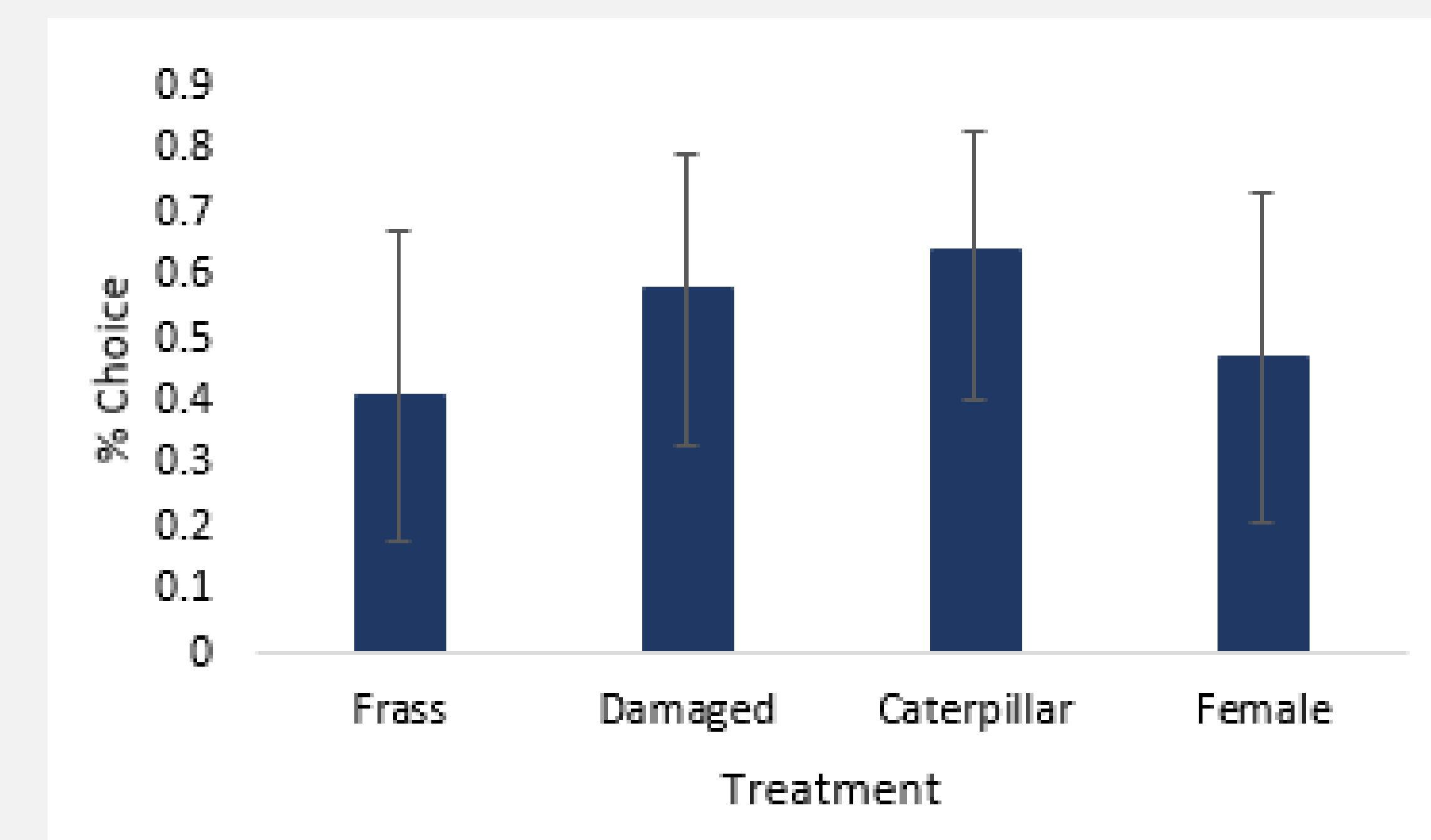


Figure 1. Percentage of individuals preferring treatment in the frass ($p > 0.05$), damaged leaf ($p > 0.05$), caterpillar ($p > 0.05$), and female experiments ($p > 0.05$).

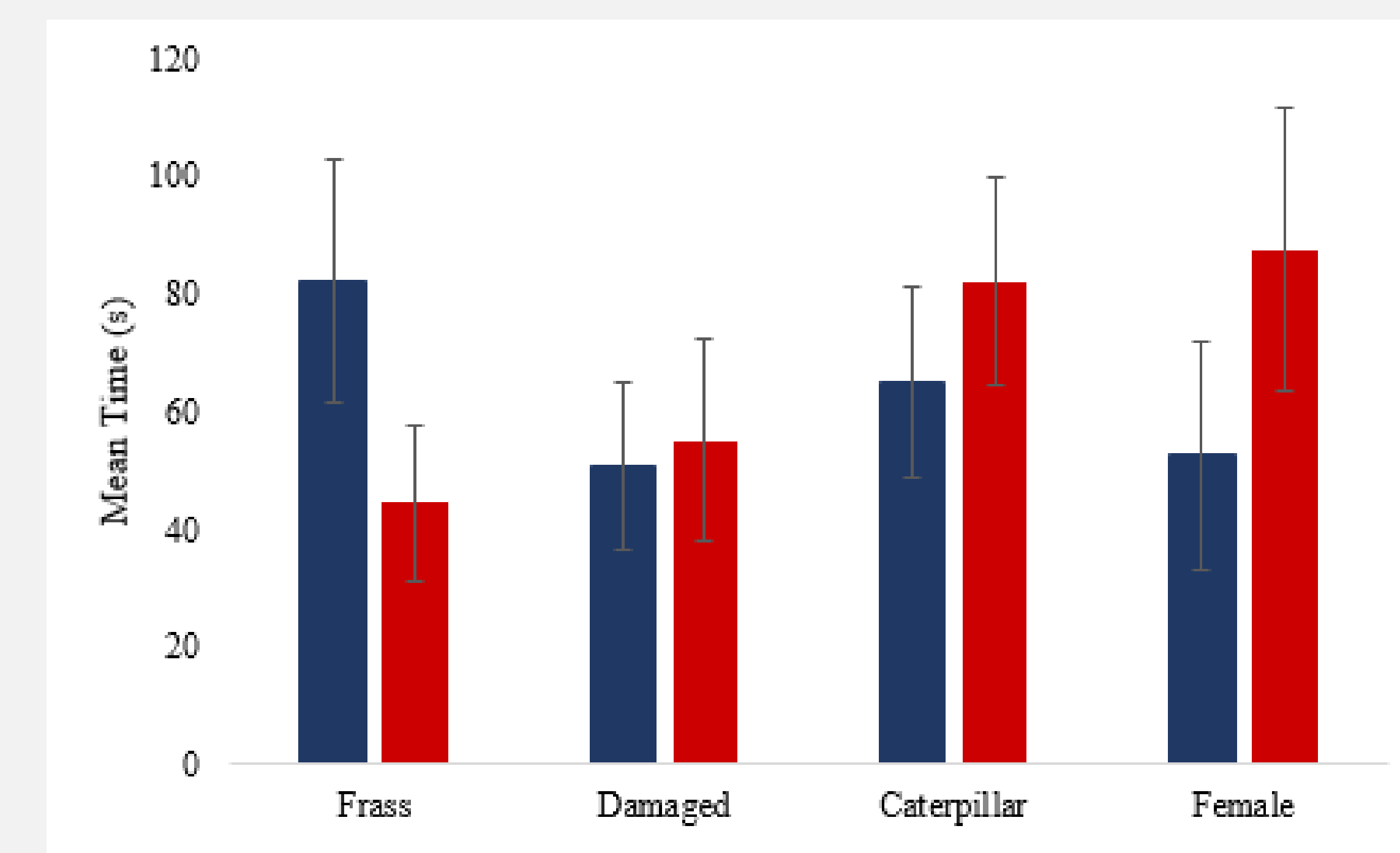


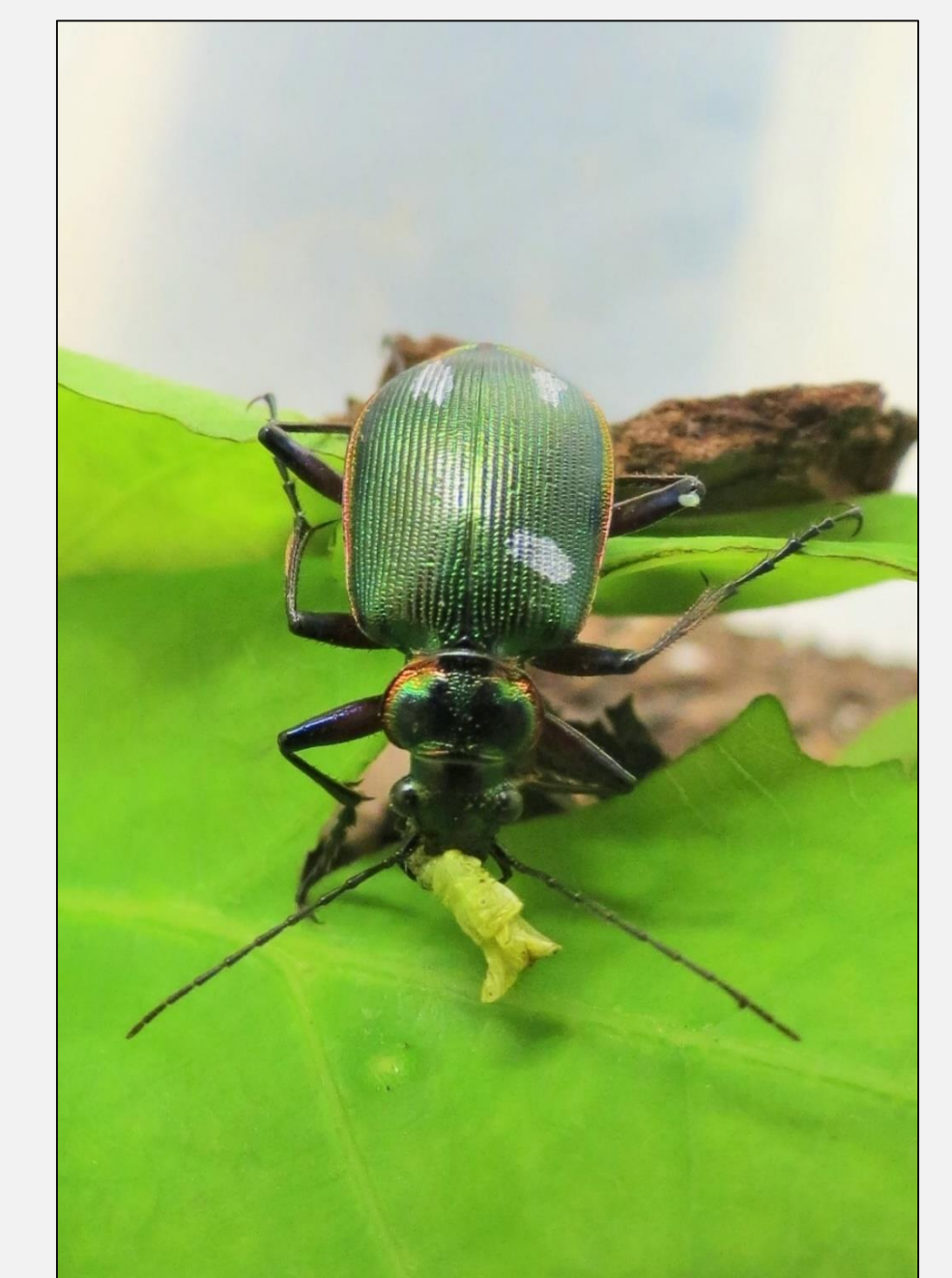
Figure 2. Mean time spent in treatment and control arms in the frass ($p > 0.05$), damaged leaf ($p > 0.05$), caterpillar ($p > 0.05$), and female ($p > 0.05$) experiments. Blue bars are representative of control means. Red bars are representative of treatment means.

Discussion

- Results provide no evidence that *C. wilcoxi* uses olfaction to locate prey.
- However, data suggest that further replications may reveal olfactory response to caterpillars and conspecifics.
- FCW feeds on many deciduous species, thus, cues associated with host plant may not be important in prey location

Future Work

- Arthropods have also been shown to rely on tactile, visual, and gustatory cues to locate prey. Antennal gustation may influence searching behavior of ground beetles. Further experiments will be run to test for olfactory cues of caterpillars and conspecifics. Future studies will examine the role of gustation and tactile cues in foraging behavior.



Acknowledgments

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