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## Diversity of Bees in Trees on an Urban College Campus

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## Background

- Pollinators collect nutrients from blooming flowers; pollen provides proteins and fats, nectar provides carbohydrates.
- The few plants that bloom during early Spring are trees, such as crabapple (*Malus sp.*).
- Current research however, mainly focuses on pollinators that forage on the ground and thus, overlooks pollinators foraging in trees.
- Here, I identified which bee species forage in the canopy on Providence College campus.
- These data can inform more specific research on diet breadth, foraging behavior, conservation, etc.

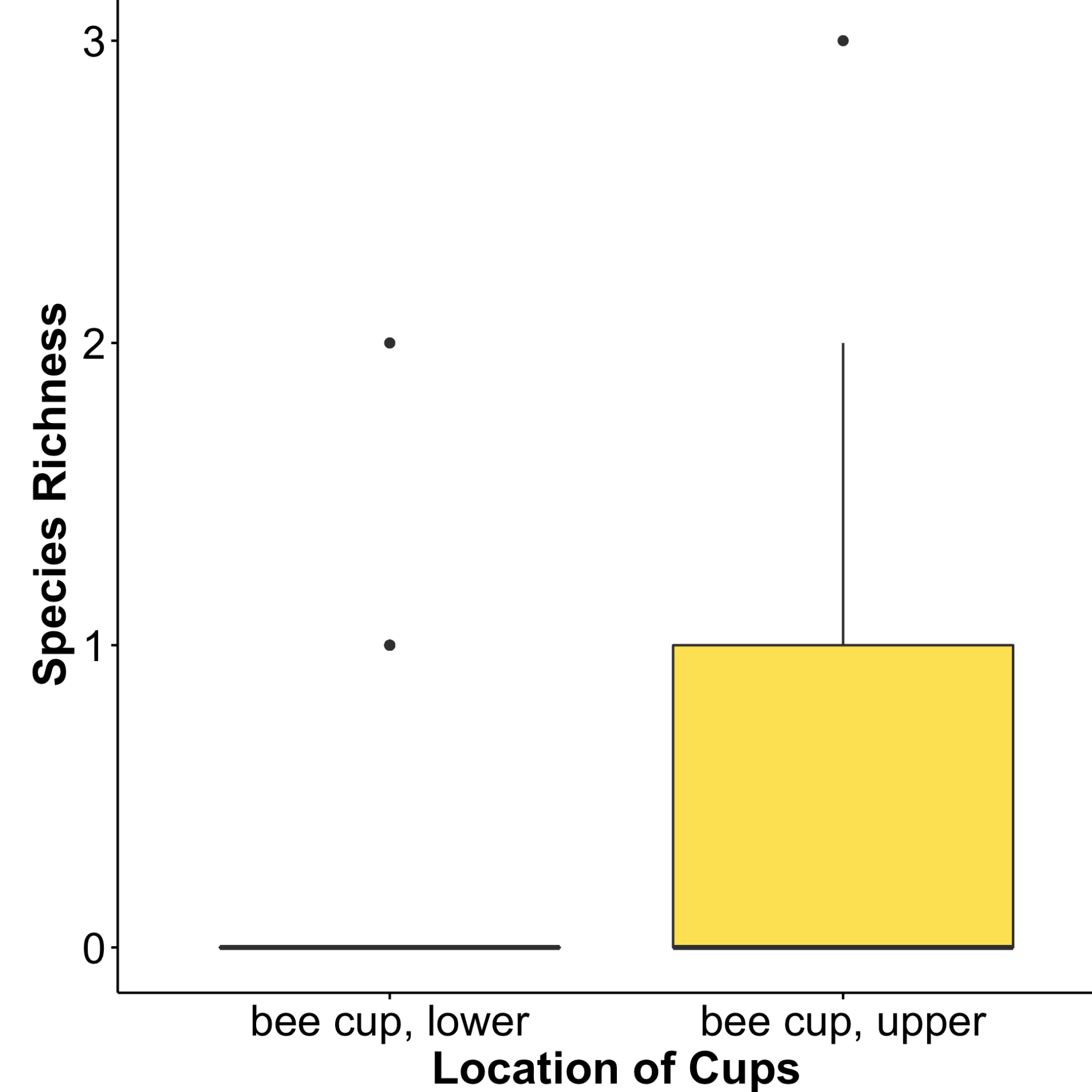
## Methods

- Bee cups were strung up and collected weekly (Fig. 1a). Cups were painted green, yellow, and white and filled with soapy water<sup>1</sup> (Fig. 1b).
- Sweep netting was done twice a week for 10 minutes at flowering trees (Fig. 1c). Captured insects were identified to species.
- All specimen caught in bee cups or kept from sweep netting were pinned and identified.

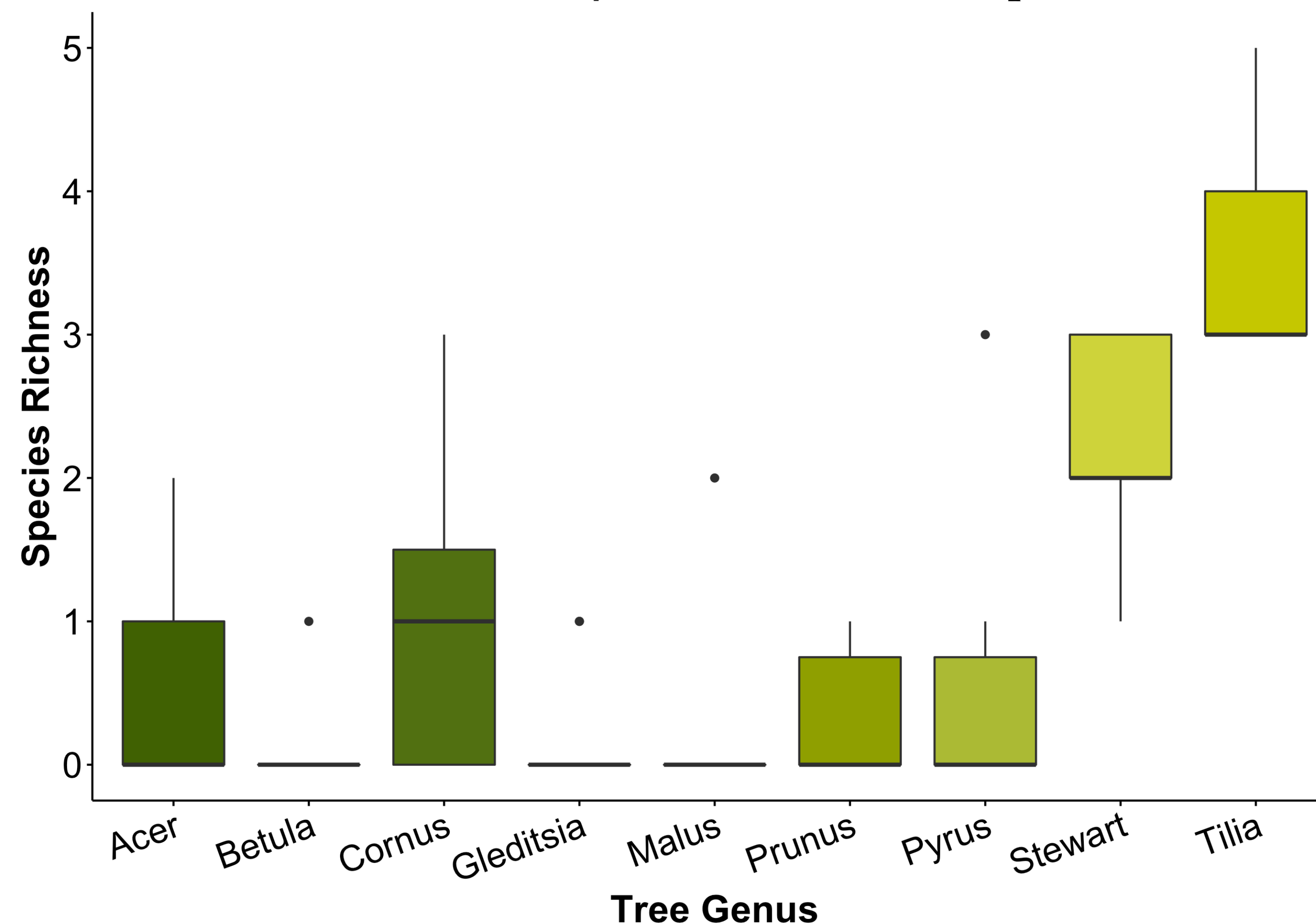
## Results

I found 85 bees of 22 species/genera (Fig. 2).

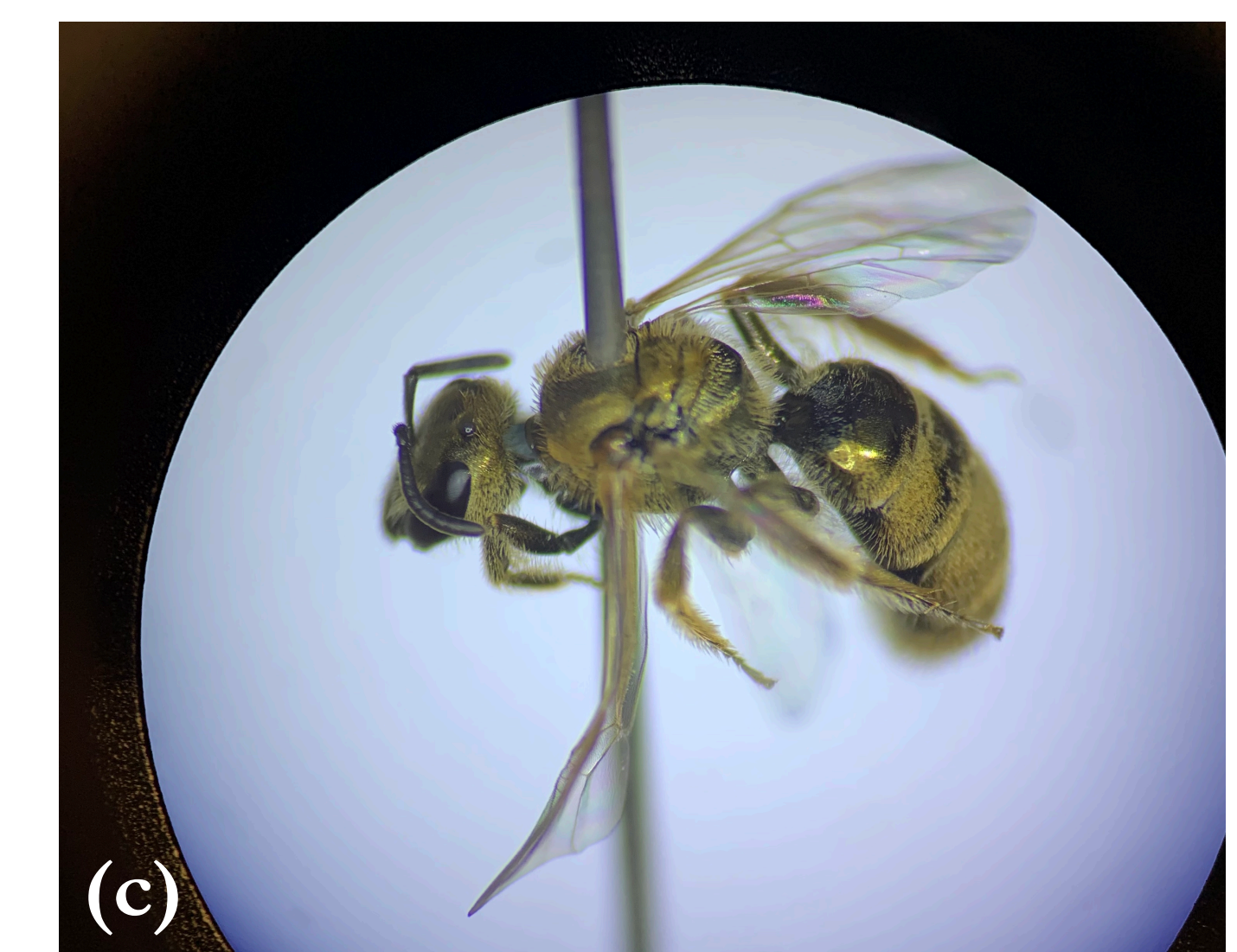
Cups in the upper part of the canopy trapped significantly more bee species than cups in the lower part of the canopy (Fig. 3: Anova,  $X^2 = 6.283$ ,  $df = 1$ ,  $p < 0.05$ ). Species richness was not significantly different between canopy and sub canopy trees, determined by height (Anova,  $X^2 = 0.085$ ,  $df = 1$ ,  $p = 0.7706$ ), but it was significantly different among tree genera (Fig. 4: Anova,  $X^2 = 39.405$ ,  $df = 8$ ,  $p < 0.001$ ). *Tilia* and *Stewart* trees hosted the most species of bees.



**Fig. 3** Location of cups v. bee species richness



**Fig. 4** Tree genera v. bee species richness. Data includes bees caught in upper cups and during sweep netting.



**Fig 2.**  
a.) Confusing bumble bee (*Bombus perplexus*) on anise hyssop  
b.) Broad-handed Leafcutter bee (*Megachile latimanus*)  
c.) *Lasioglossum pilosum* under a microscope

## Conclusions

I collected species of bees that have not been collected to past bee bowl and garden surveys. Therefore in order to build an insect pollinator reference collection, we cannot overlook the trees. Specific trees I have found to be pollinator friendly are littleleaf linden (*Tilia cordata*), Japanese stewartia (*Stewart pseudocamellia*), and dogwoods (*Cornus sp.*).

## Acknowledgements

This research was supported by the Providence College Walsh Fellowship. Thank you to Dr. B, Billy Dunne and everyone in the Bonoan lab for helping me whether it was with setting up the pulley system or setting up/collecting the bee cups, etc.

## Literature Cited

1. Urban-Mead, K.R., Muñiz, P., Gillung, J., Espinoza, A., Fordyce, R., van Dyke, M., McArt, S.H., Danforth, B.N., 2021. Bees in the trees: Diverse spring fauna in temperate forest edge canopies. *For. Ecol. Manage.* 482, 118903.



**Fig. 1**  
a.) Bee cups being set up in a Norway maple (*Acer platanoides*).  
b.) Bee cups located in the canopy (upper) of a kousa dogwood (*Cornus kousa*).  
c.) Sweep netting being done in a littleleaf linden (*Tilia cordata*).