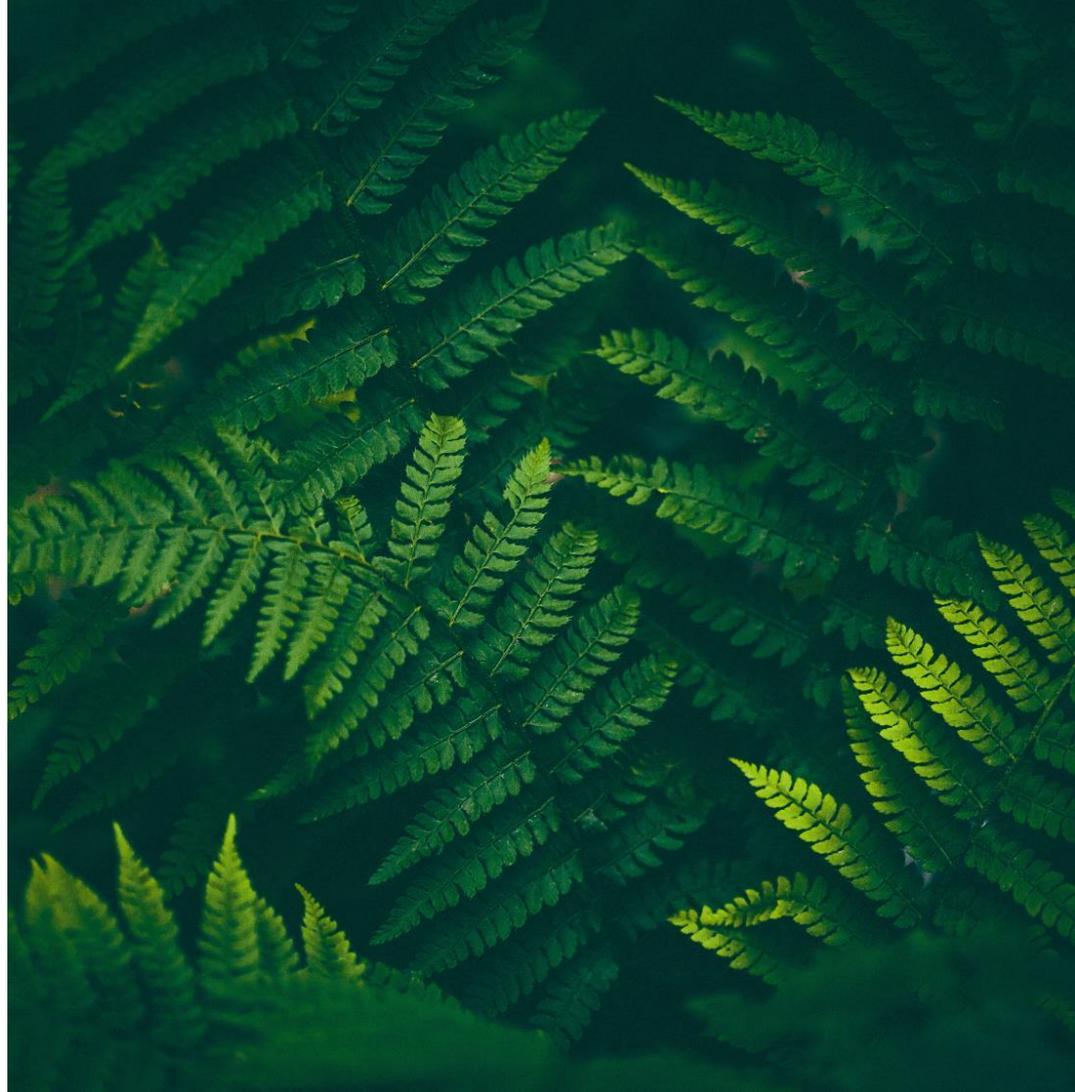


*Sugar Feeding by
Invasive Mosquitoes
on Ornamental
Plants*

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VMCA 2020 – Virginia Beach, Va



Introduction

- » Sugar feeding is important for both male and female mosquito life (Foster, 1995) (Upshur *et al.*, 2019)
- » Mosquitoes use olfaction (among other cues) to find their blood and sugar meals (Bowen, 1991; Ray, 2015)
- » *Aedes aegypti* and *Aedes albopictus* are two invasive species that are spreading through the US quickly, bringing disease with them (Reinhold *et al.*, 2018)



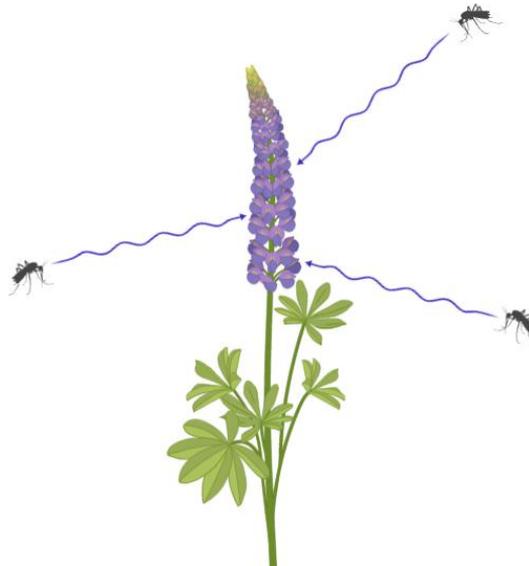
Aedes aegypti



Aedes albopictus

Introduction

- » Recently emerged mosquitoes need plant fluids to survive long enough to blood-feed, and make better use of their blood meal (Foster, 1995)
- » In addition, they receive non-carbohydrate nutrients including amino acids, salts, and vitamins from nectar or other plant-derived fluids (Baker & Baker, 1973; Nicolson & Thornburg, 2007; Rivera-Perez *et al.*, 2017)
- » I **hypothesize that** invasive mosquitoes use sugars in the flowers we plant in urban areas, which contributes to the success of these species and their ability to be efficient disease vectors



Introduction - Flower Roster



Celosia



Marigold



Yarrow



Guara



Goldenrod



Lantana



Wave
Petunia



Red
Impatiens



Scaevola



Mexican
Heather



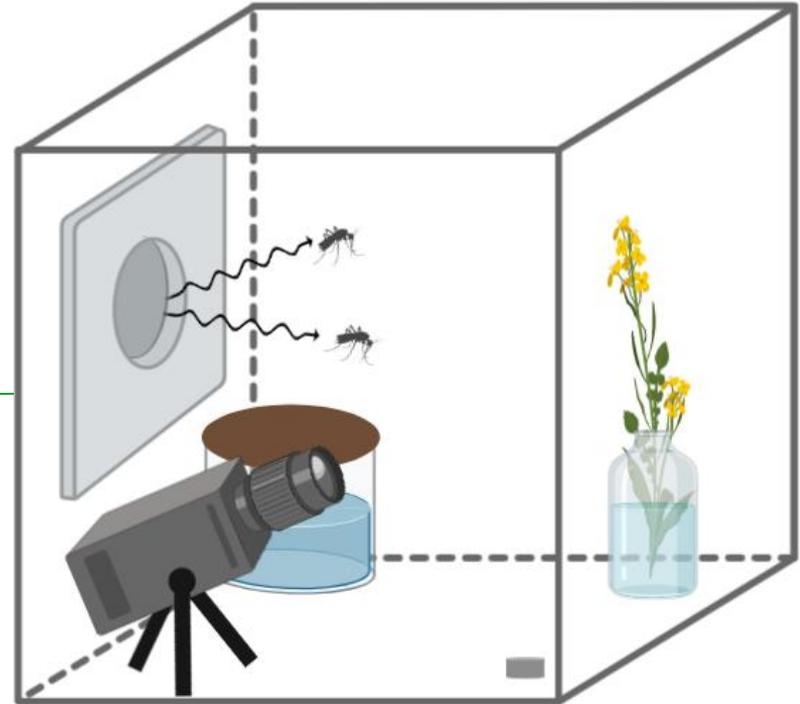
Butterfly
Bush

Plant Visitation Assays

Question(s)

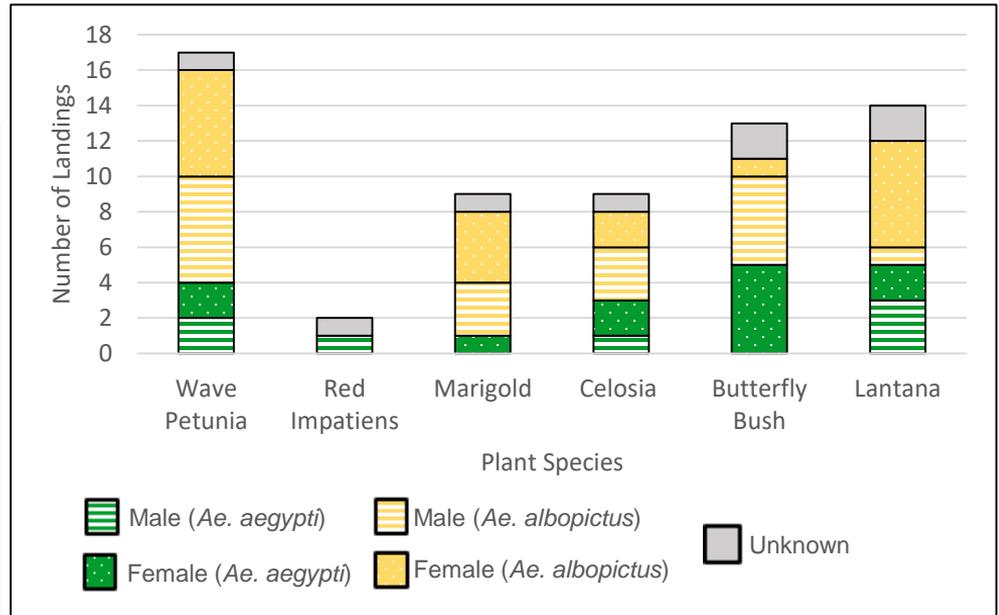
- » What plants are the mosquitoes feeding on?
- » Are some plants avoided / preferred?

- 11 different plants total
- Mosquitoes are starved 1-2 days upon emergence
- Three replicates of experimental group: (10 females, 10 males) for both lab-reared species simultaneously running for one plant species
- Subsequent sugar analysis on mosquitoes



Plant Visitation Assays

Goldenrod Visitation

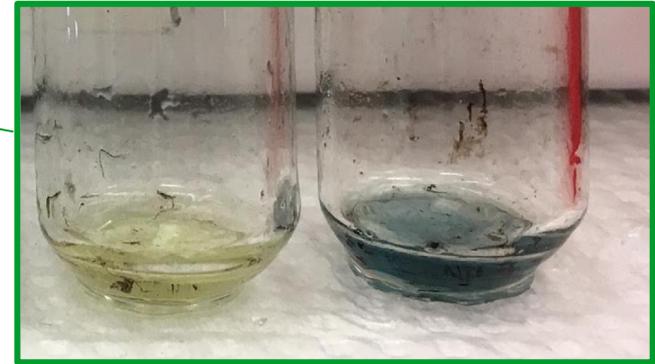
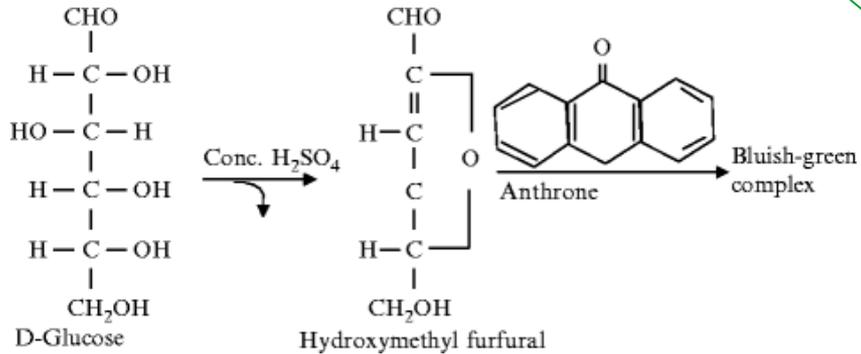


- » For some plant species, both mosquito species are active
- » Males and females act differently for some plant species

Sugar Analysis

Question(s)

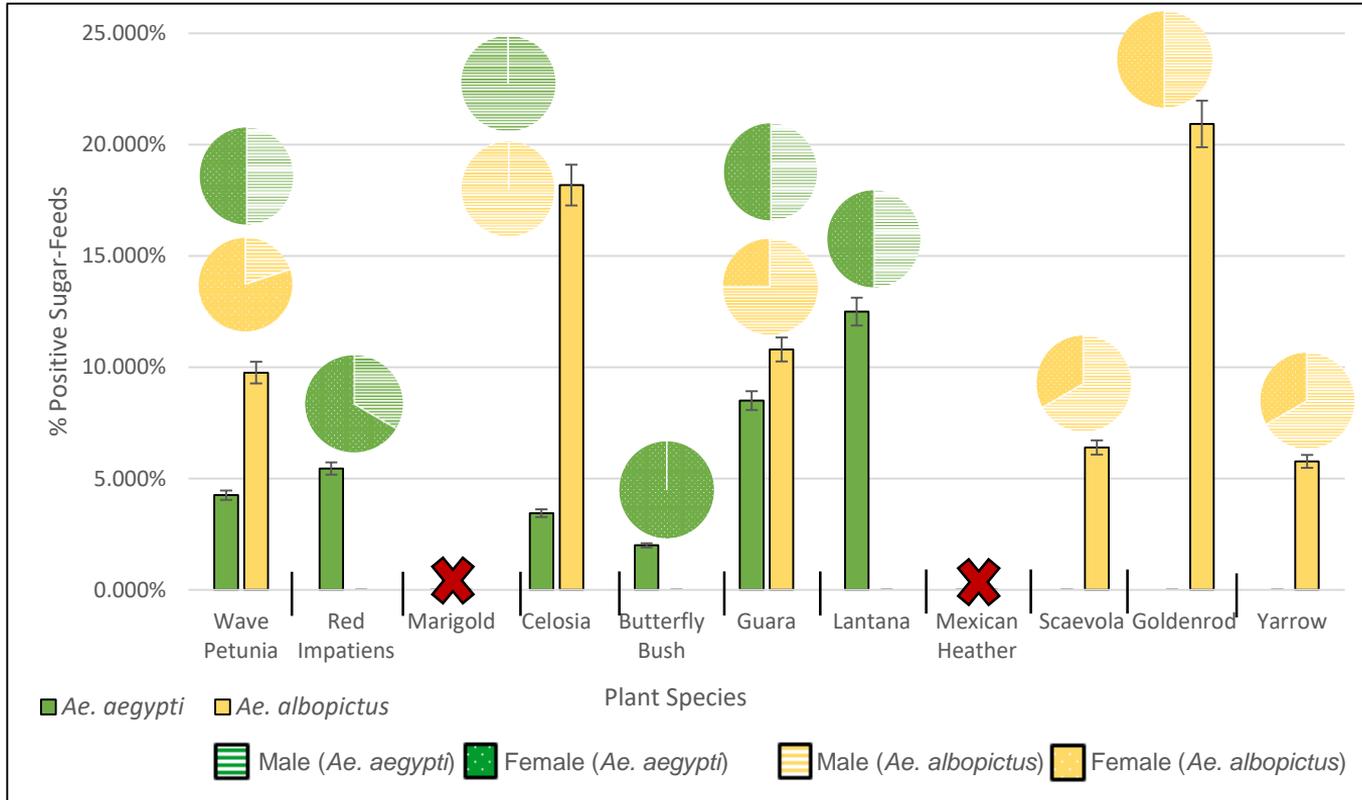
- » Did they feed in the nectar?
- » Cold anthrone test on collected mosquitoes (Van Handel, 1985)



(-)

(+)

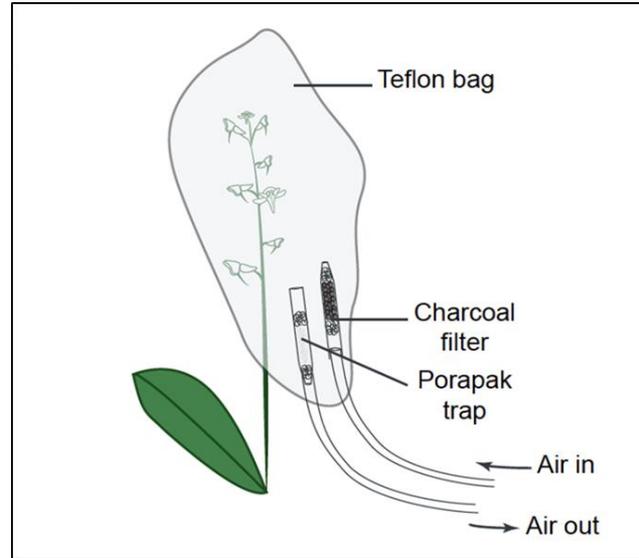
Sugar Analysis



Scent Collection

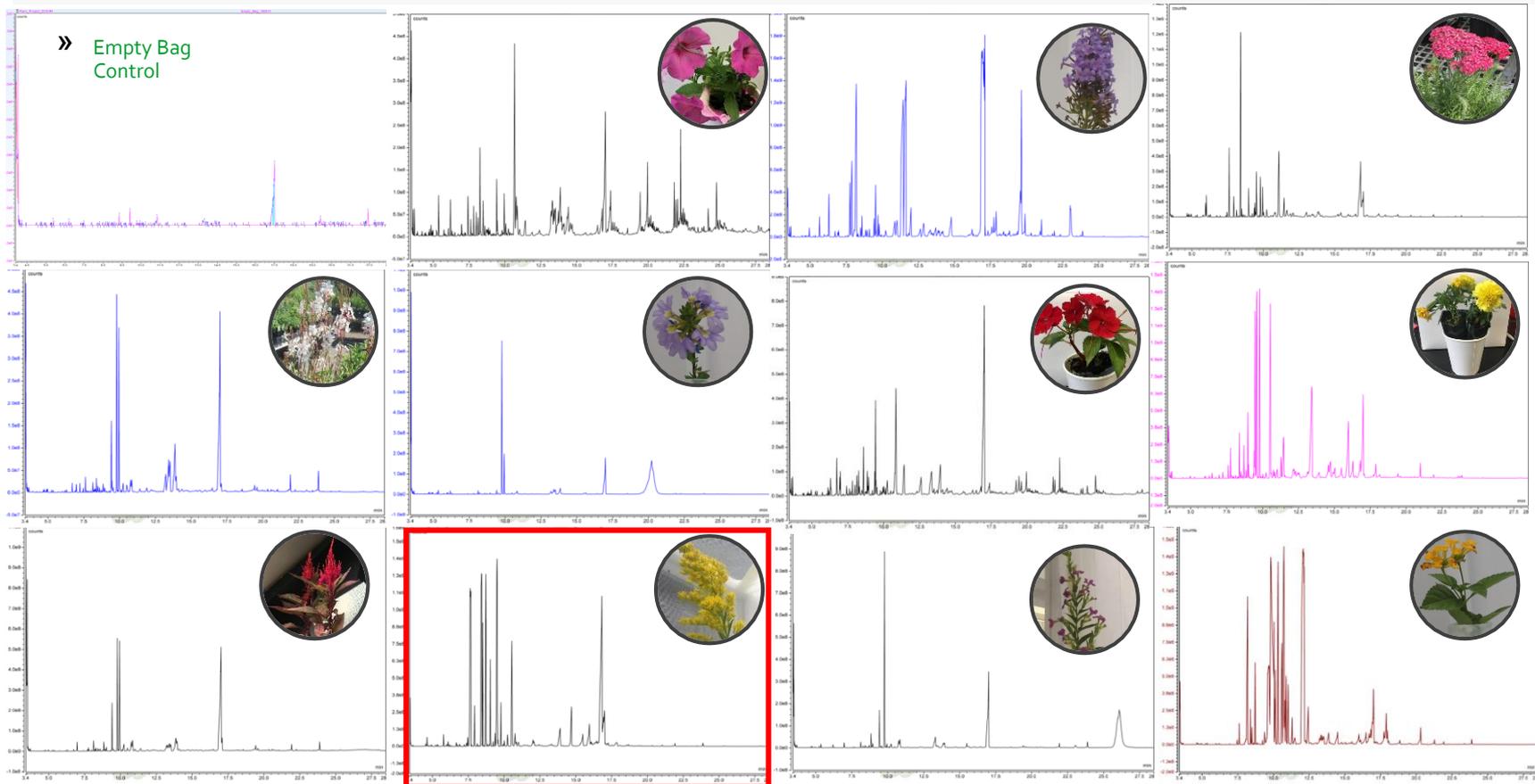
Question(s)

- » Do they use scent to locate the plants?
- » What compounds are they using?

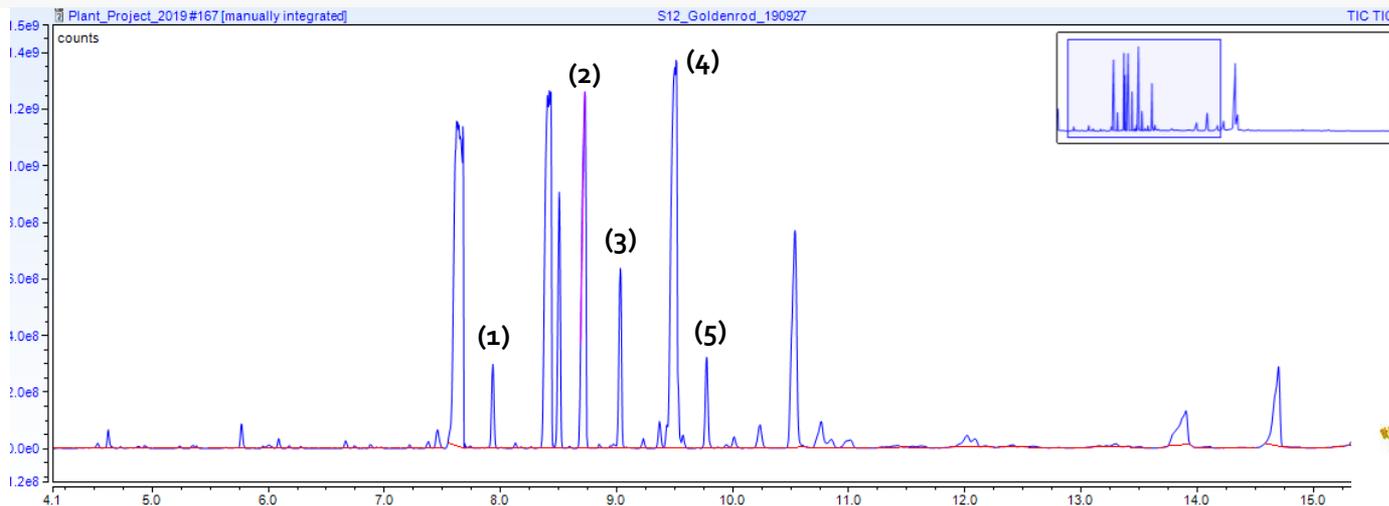


Lahondère *et al.*, 2019

Scent Collection: GC-MS Analysis



Scent Collection: GC-MS Analysis



▶ Camphene (1)

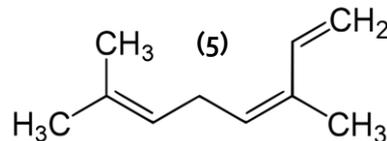
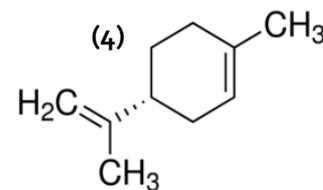
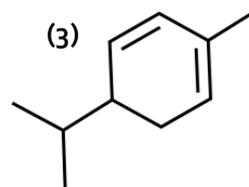
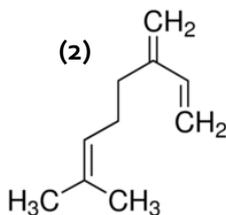
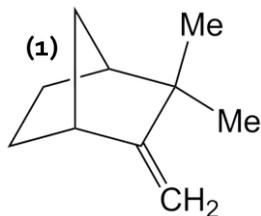
▶ β -Myrcene (2)

▶ α -Phellandrene (3)

▶ Limonene (4)

▶ β -Ocimene (5)

▶ Mosquitoes are known to respond to these compounds

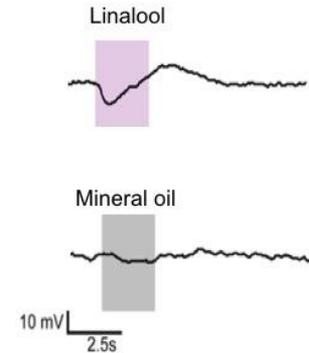
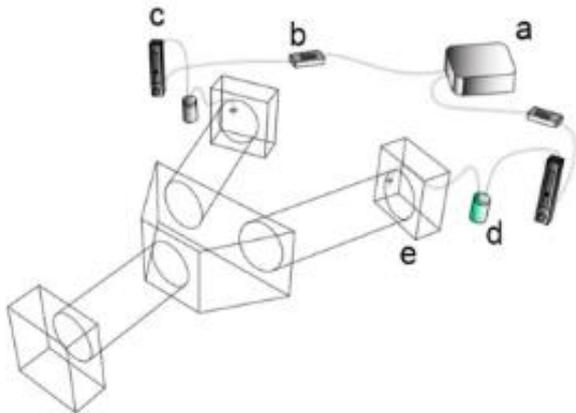
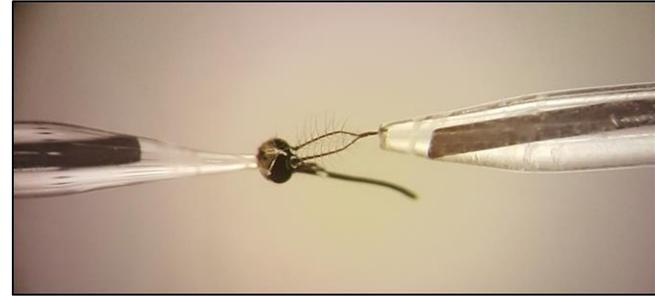


Solidago gracillima
(goldenrod)

Wrapping Up: GC-EAGs / Olfactometer

Question(s)

- » Which volatile compounds in the plant's scent cause a response in these mosquitoes?
- » Are these attractive or repellent responses?



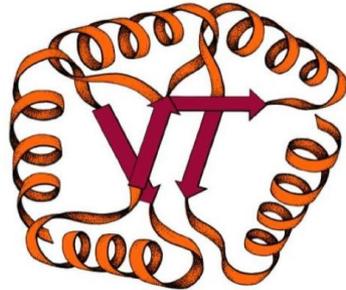
Long-Term Goals

- » Inform the public against planting flowers attractive to *Ae. aegypti* and *Ae. albopictus*
- » Bait development



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- » Lahondère Lab
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GLOBAL CHANGE CENTER
AT VIRGINIA TECH

THE EPPLEY FOUNDATION
FOR RESEARCH

SUPPORT FOR ADVANCED SCIENTIFIC RESEARCH

Thank you

Questions?

Quantitative

