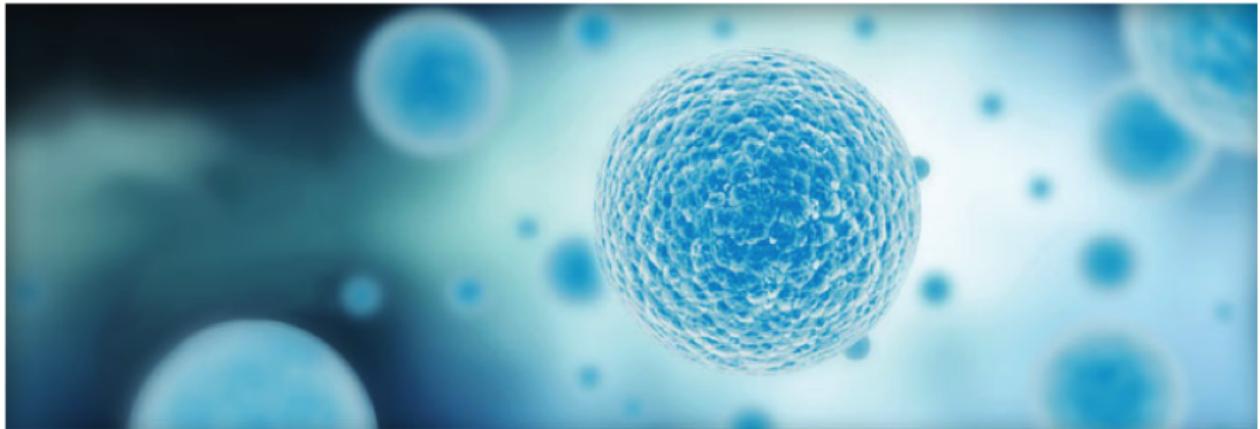


Bee Virus Ecology

Samantha Alger



Disease Ecology

Study of interactions among wildlife hosts, vectors, pathogens, and their environment

- Prevalence?
- What influences disease spillover?
- When do outbreaks occur?
- How does the environment influence interactions between hosts and pathogens?







Plant-Insect-Pathogen Interactions

- Fire Blight - (Bacteria): Infects nectar secretion site in apples and pears, carried by bees
- Mummy berry disease - (Fungus): Infects blueberry stems and wilted leaves become 'pseudoflowers' that attract insect visitors with 'nectar', UV, and scent
- Crithidia & Nosema* spp. - (Trypanosome & Microsporidian): Infects bees through use of shared flowers, probably through feces, some plants may be better at harboring the diseases

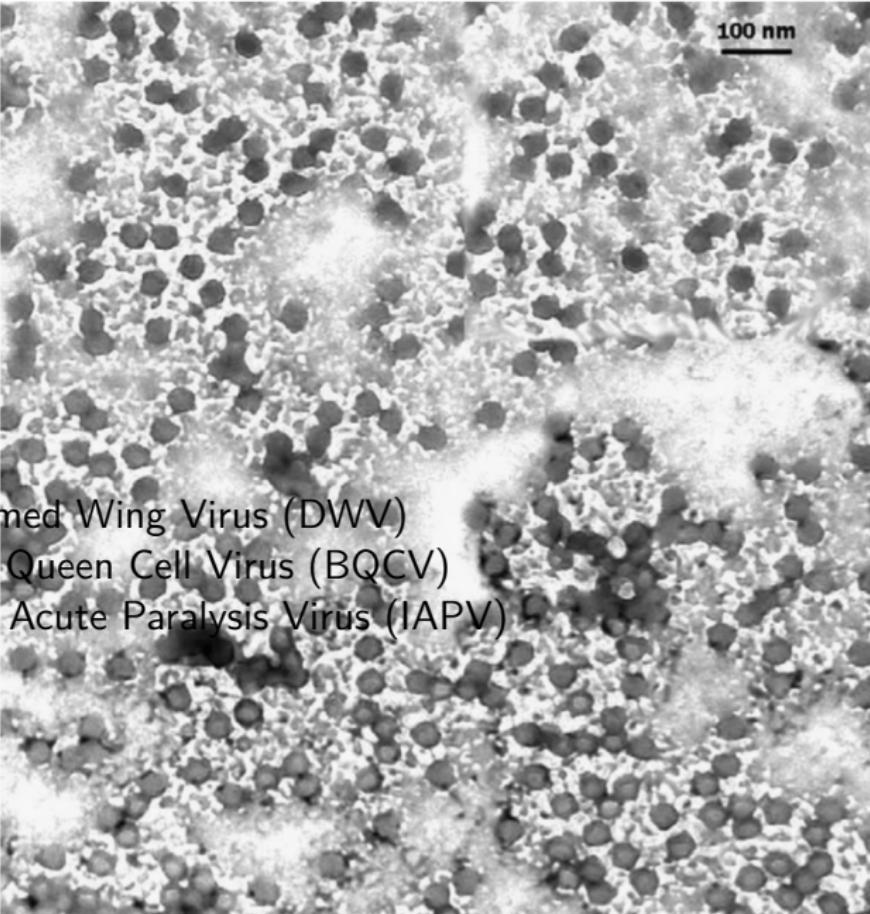
It's Official!



Rusty Patched Bumble Bee • *Bombus affinis*

First bee in the continental U.S. to be listed
under the Endangered Species Act

Xerces Society



100 nm

Deformed Wing Virus (DWV)
Black Queen Cell Virus (BQCV)
Israeli Acute Paralysis Virus (IAPV)

Deformed Wing Virus

Black Queen Cell Virus

Israeli Acute Paralysis Virus

Flow Diagram with pictures

Research Questions

Part I.

What is the prevalence of RNA viruses in bumble bees?

Is there evidence for disease spillover from managed honey bees?

Part II.

Can flowers act as bridges in disease transmission?

#flow chart pictures

Map image

Field work pictures

Results

Results

Flow Chart

Results

Results

Research Questions

Part I.

What is the prevalence of RNA viruses in bumble bees?

-BQCV is most common, followed by DWV

Is there evidence for disease spillover from managed honey bees?

-Yes, bumble bees are more likely to be infected when caught near an apiary and when the apiary has high viral loads

Part II.

Can flowers act as bridges in disease transmission?

###flow chart pictures

Flow Chart

Greenhouse pic

bumble Bee pics

plant species pics

Experimental set up pics

Results

plant species slide

-Does plant species matter?

Results

Research Questions

Part I.

What is the prevalence of RNA viruses in bumble bees?

-BQCV is most common, followed by DWV

Is there evidence for disease spillover from managed honey bees?

-Yes, bumble bees are more likely to be infected when caught near an apiary and when the apiary has high viral loads

Part II.

Can flowers act as bridges in disease transmission?

-Bees can deposit viruses on flowers

-Plant species and virus matter!

Questions for future work...

- Can bees become infected after visiting an infected flower?
- Are there differences in how viruses are shed?
(Fecally vs. Orally)
- Does floral morphology matter?

Implications

- BQCV is common in bumble bees and its effects should be studied
- Reducing honey bee viral loads (mite management) could lessen spillover of DWV
- Recommendations for 'pollinator friendly' habitat

Contributors and Collaborators

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