What’s killing the honey bees?

GROW
NEXT GEN

What products or jobs do honey bees provide?

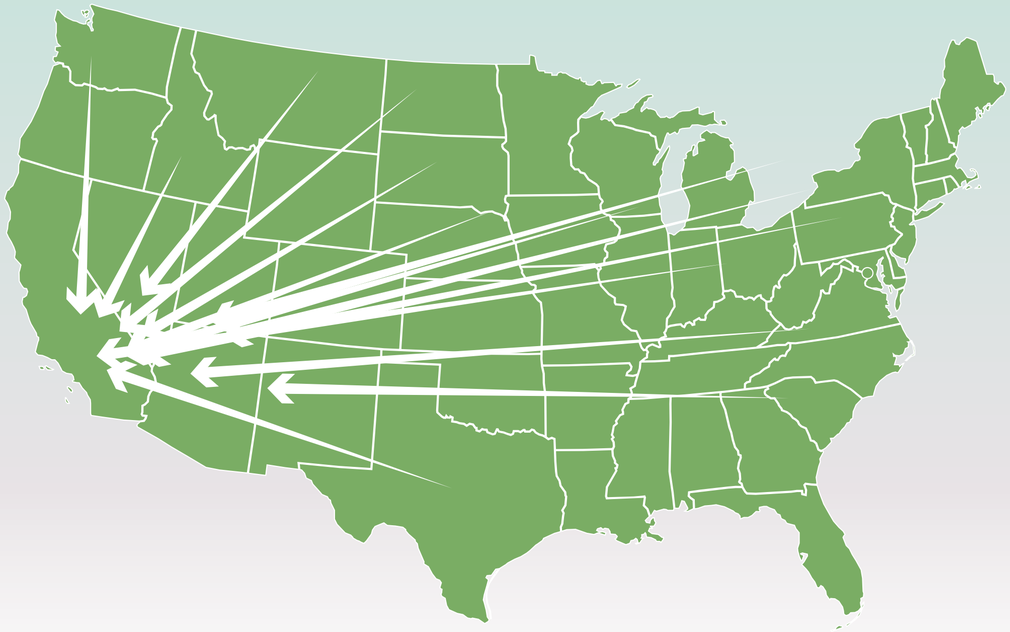
Honey bees are known for their honey.

Bees are important to our food supply in other ways

75% of flowering plants and **35% of food crops** rely on pollinators.

Beekeepers travel around the US with their hives

Almond pollination brings 2,000,000 hives to California where 80% of the world’s almonds are grown each year.

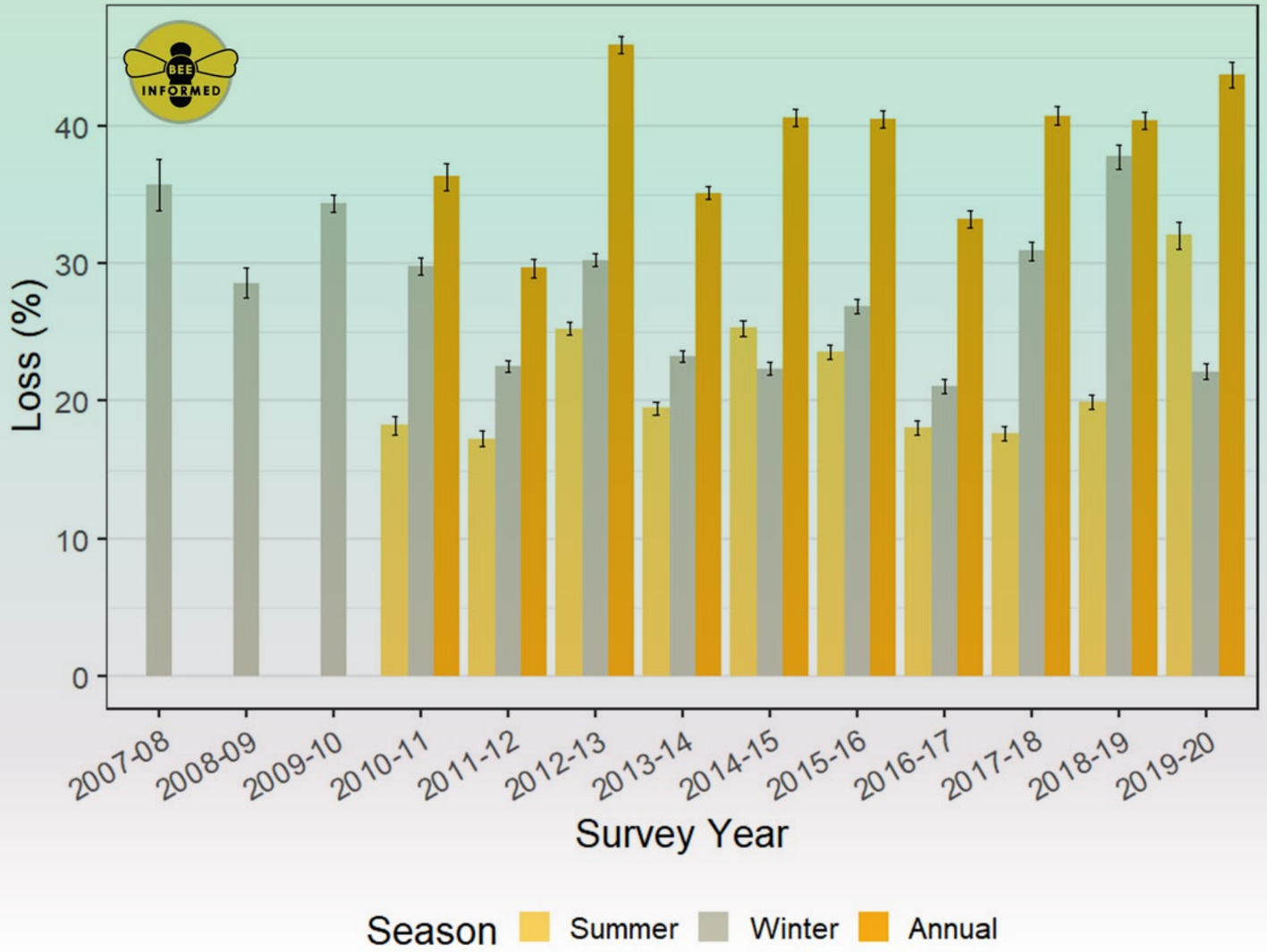


Bee colonies
in the orchard

Almond bloom

What threatens honey bee colonies?

There is a problem: annual colony loss



Global honey bee (and pollinator) crisis

Journal of Apicultural Research 49(1): 104-106 (2010)
DOI: 10.3896/IBRA.1.49.1.18

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NOTES AND COMMENTS

Honey bee colony losses in Canada.

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Received 5 May 2009, accepted subject to revision 2 October 2009, accept

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Keywords: Colony loss, *V*

The parasitic mite *Varroa d*
reported in Canada in 198
most beekeeping regions i
movement of colonies betw
effective control of mites t
fluvalinate (Apistan®) and f
of *V. destructor* in Canada
Resistance of *V. destru*
through laboratory testing

Journal of Apicultural Research 49(1): 15-22 (2010)
DOI 10.3896/IBRA.1.49.1.02

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ORIGINAL RESEARCH ARTICLE

Declines of managed honey bees and beekeepers in Europe

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ublication 7 October 2009.

PLoS BIOLOGY

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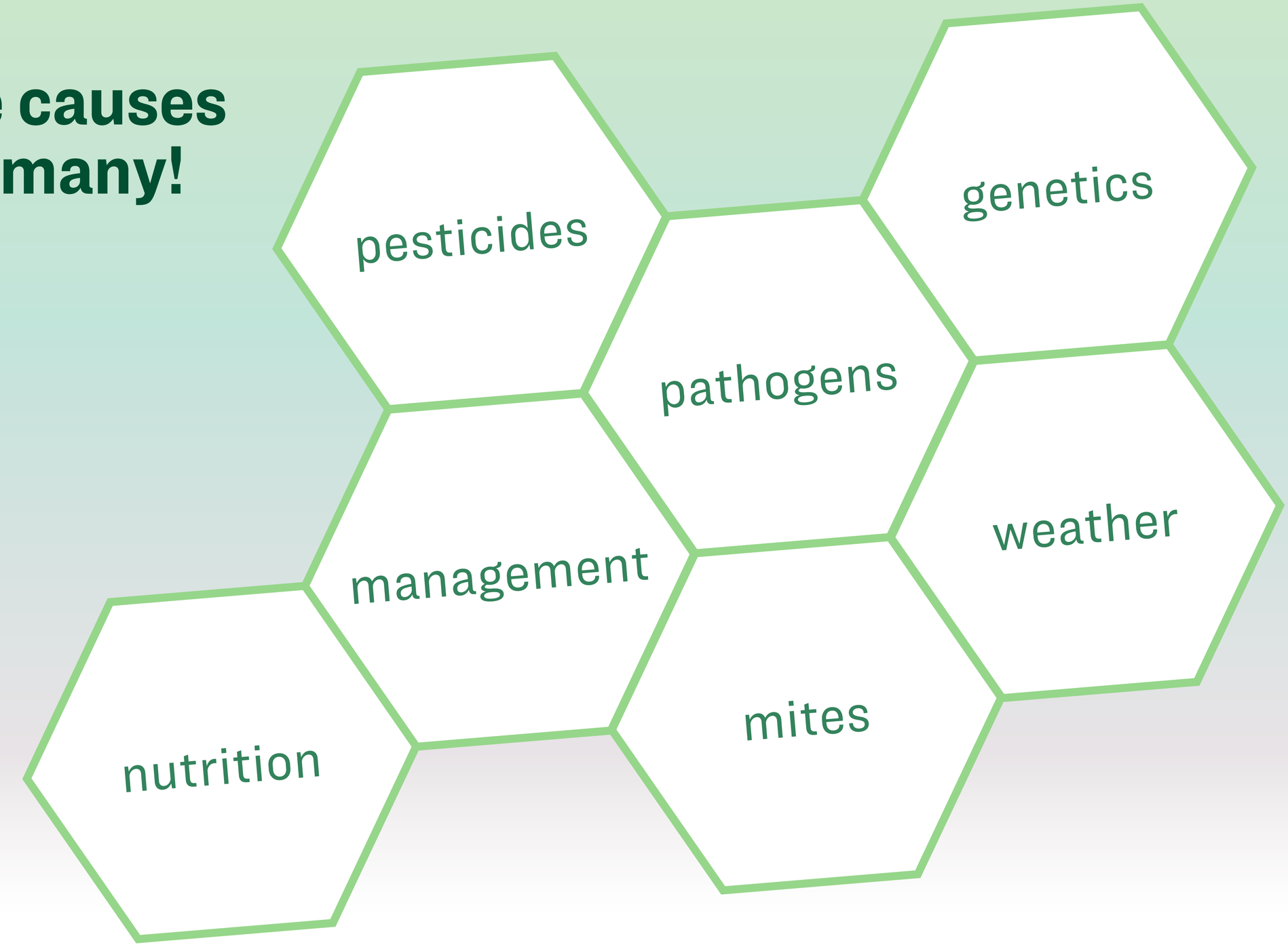
Unsolved Mystery

What's Killing American Honey Bees?

Benjamin P. Oldroyd

On February 22, 2007, many Americans woke up to media reports that something was awry with their honey bees. A significant proportion of American beekeepers were complaining of unusually high rates of colony loss as their bees broke from their overwintering clusters. Loss of some colonies (say 10%) in early spring is normal and occurs every year. In 2007, however, losses were

The causes are many!

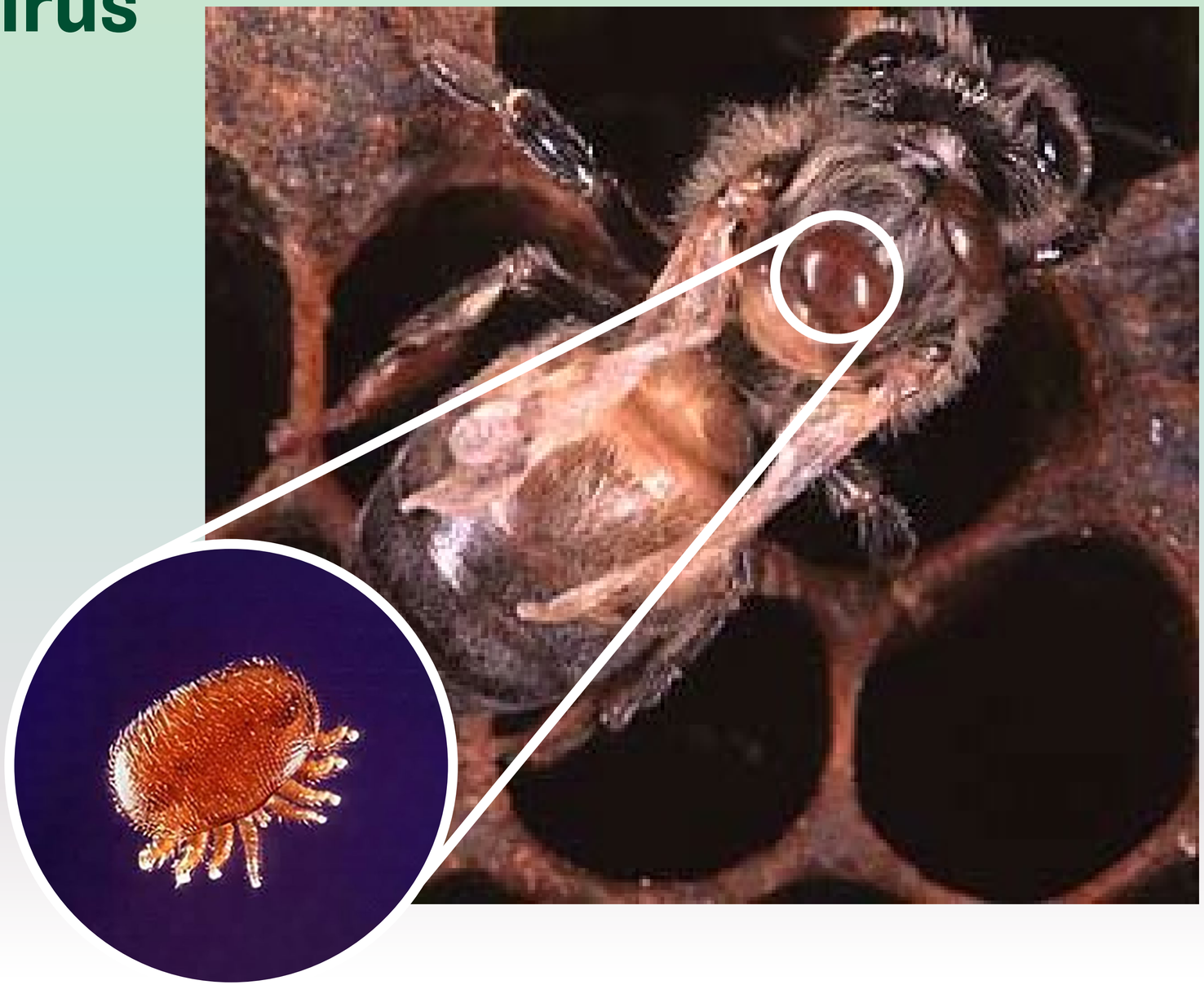


Sometimes sick colonies have symptoms...

...and sometimes not.

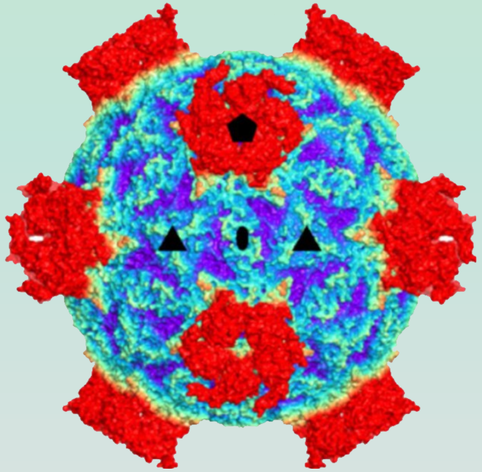
Deformed Wing Virus

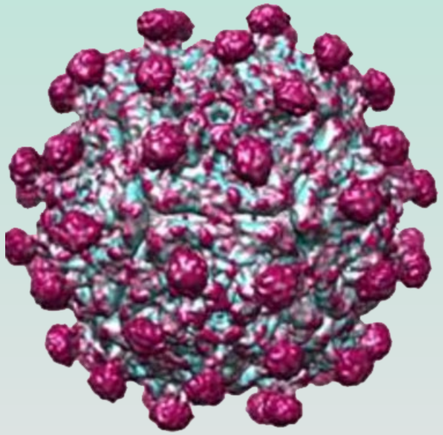
- Found globally
- RNA virus
- One of the few that produces symptoms
- High infections associated with colony loss
- Transmitted by a mite *(Varroa destructor)*



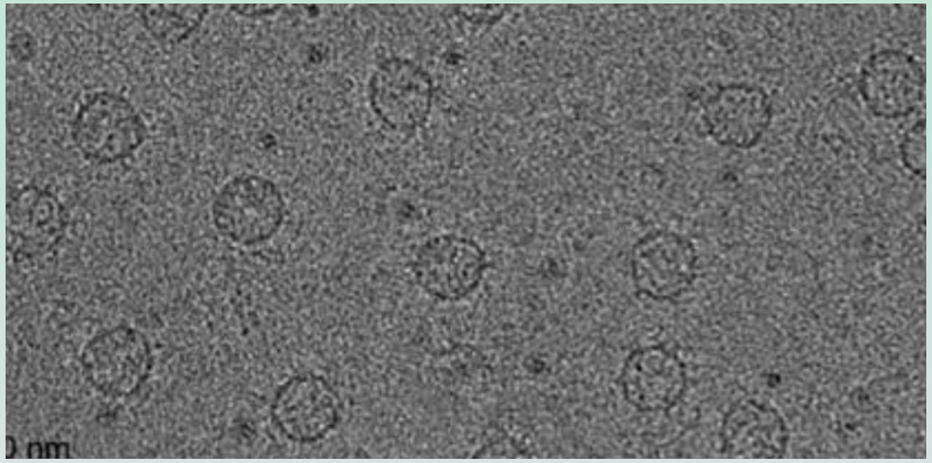
Deformed Wing Virus

Models





Electron microscope image



Genome (10,000 bps) positive-sense RNA genome (acts like mRNA)


(full genome)

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

BEE LAB

Education, research and outreach related to honey bees, wild bees and other pollinators

The Ohio State University Extension

u.osu.edu/beelab

Home

We are a research, extension and outreach construct based at the OSU Wooster campus. Our program is

Activity 1: What virus is killing honey bee colonies?

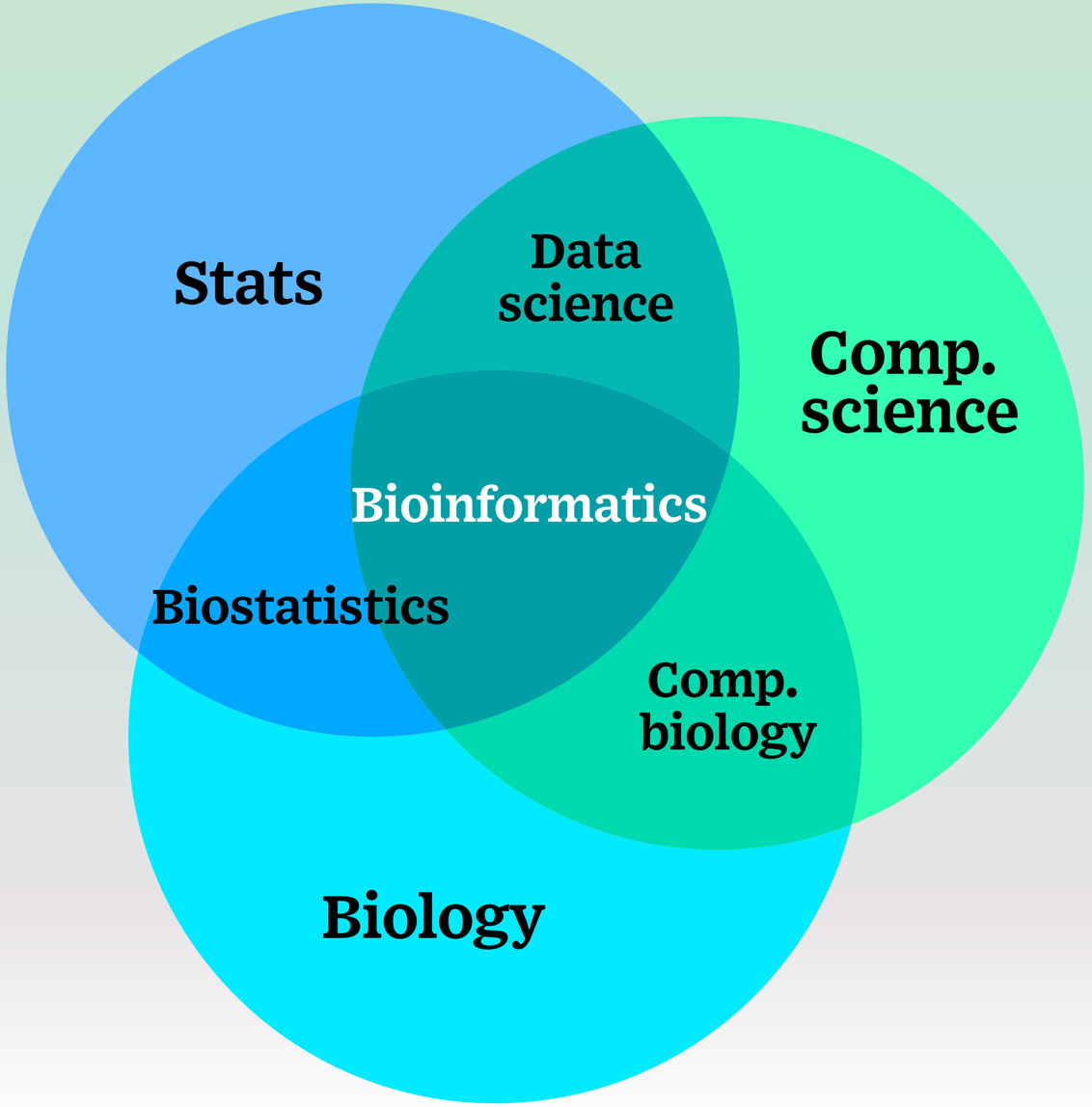
A commercial beekeeping operation has **lost 10%** of their colonies after almond pollination. Word has spread that a new variant of a virus has been discovered and is transmitted by the **parasitic mite,** *Varroa destructor.*

The beekeeper has asked the diagnostic lab to identify if the new variant (type B) is in their operation as well as create a new test that will distinguish this new variant from the other variant (type A).

To help your efforts, a researcher has isolated and sequenced a portion of the new variant found in the two dying colonies (Colony 299 and Colony 300) at the university. They have sent you the raw sequences for analysis and test development.

Bioinformatics

- Brings together biology, computer science, and statistics.
- Used to acquire, store, analyze and share large quantities of biological data – mostly DNA, RNA, and amino acid sequences.



Aims of this activity

Use the web-based program to:

- Transform raw sequencing files (ABI) into fasta sequences for further analysis
- Use BLAST, a basic bioinformatics tool, to search DNA databases
- Align sequences from the database to your unknown sequence for identification
- From these alignments, develop new primers that will only detect (amplify) the variant that matches your sequence