



# Chalkbrood research at the USDA- ARS Pollinating Insect Research Unit

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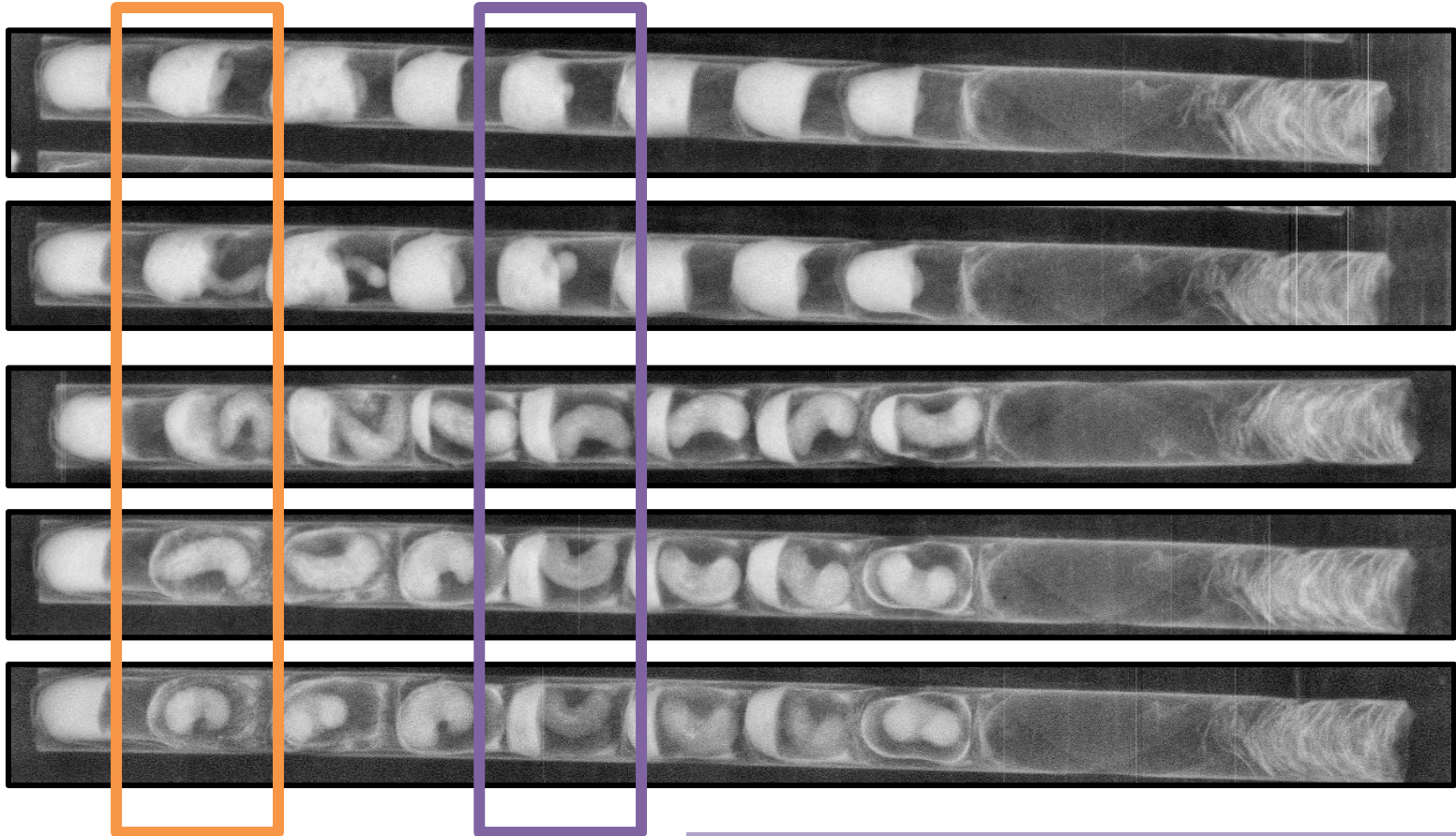




Healthy bee

Chalkbrood infected  
bee

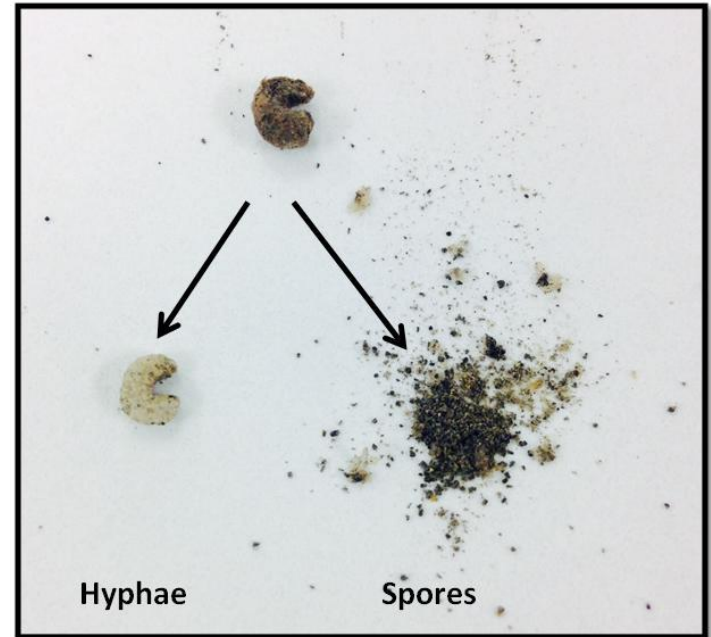
Time



This is what happens with second generation

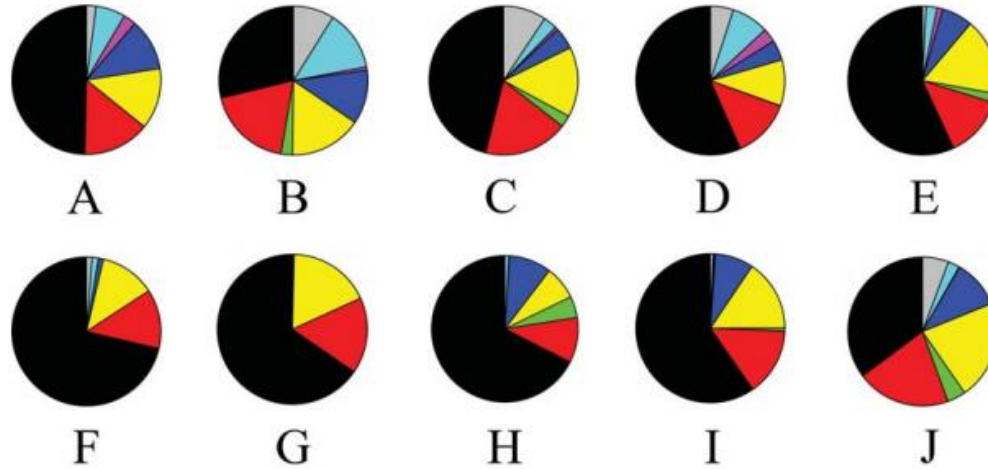
# Transfer of chalkbrood

- Second generation:  
**5 million spores**
- Loose cell:  
**31, 000 spores**



# Attempted chalkbrood control

- Fumigation
- Heating
- Ozone
- Fungicides



Healthy  
Chalkbrood  
Pollen Ball  
Other

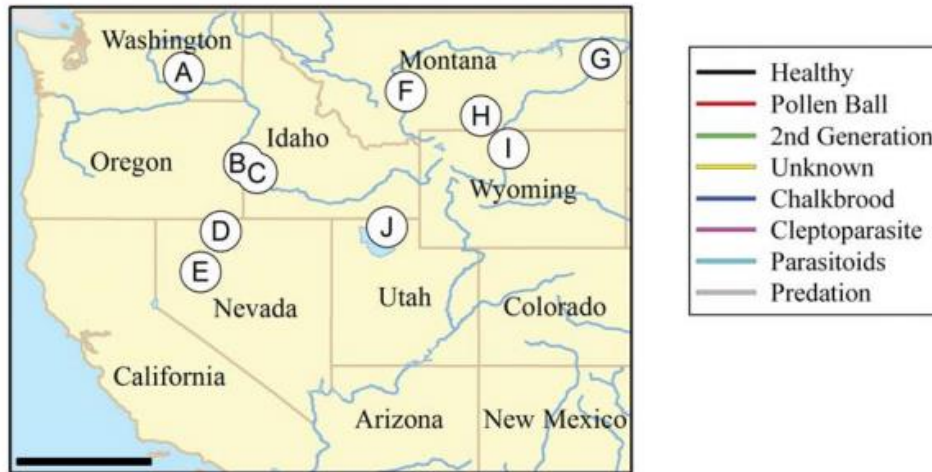


Fig. 1. Map of the farming areas where samples were taken and the proportion of cells in each health category at the end of the nesting season, averaged across each area. See Table 1 for other characteristics of the farming areas. Bar = 500 km.





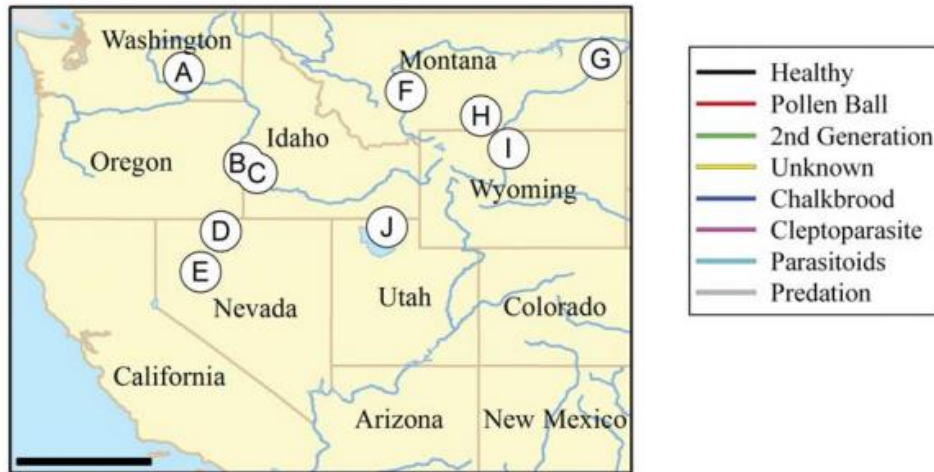
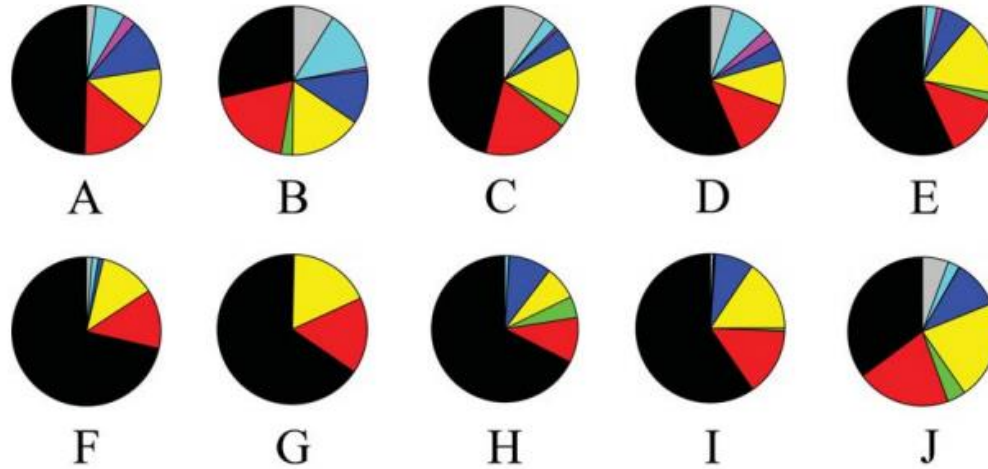
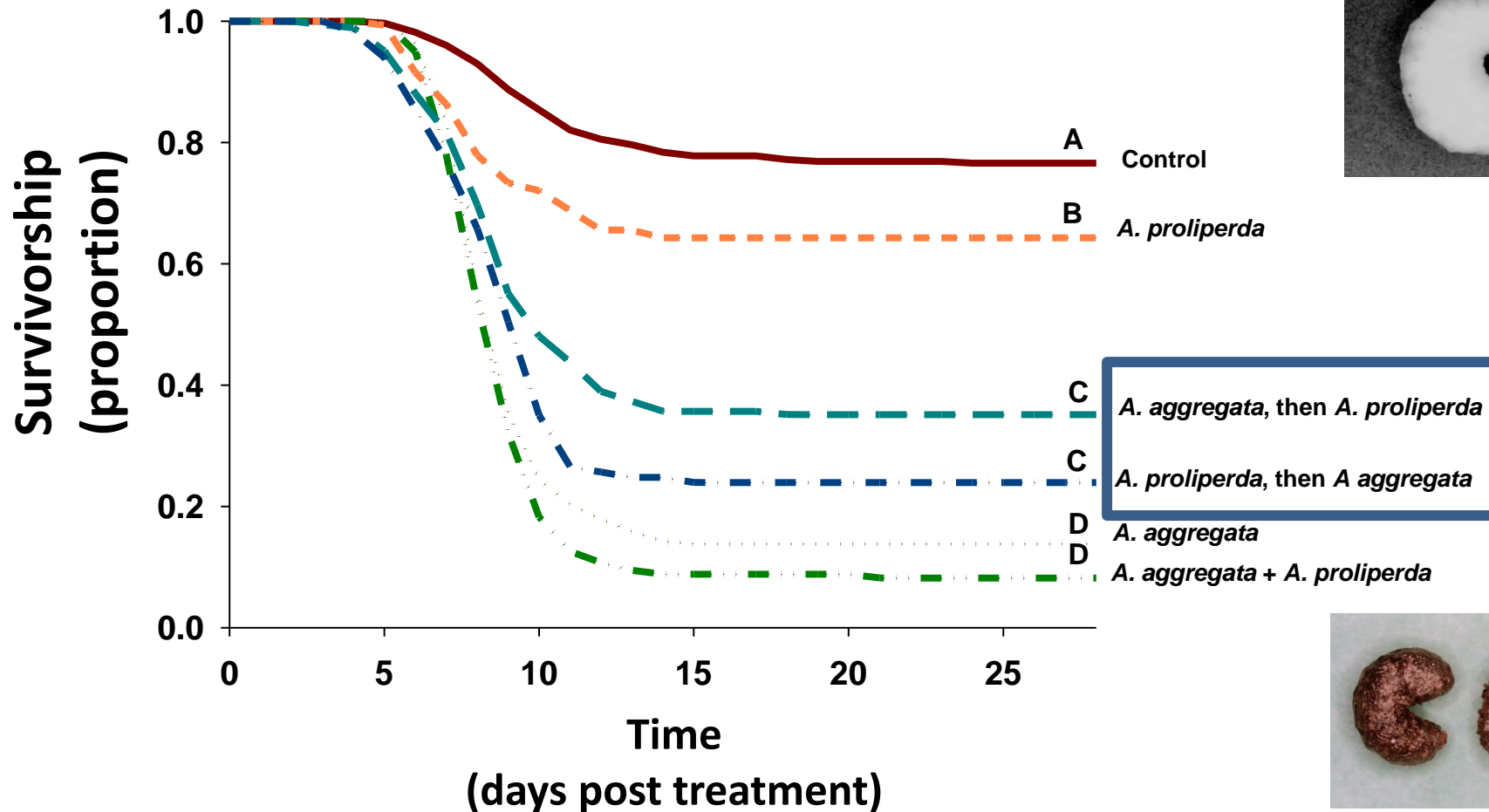


Fig. 1. Map of the farming areas where samples were taken and the proportion of cells in each health category at the end of the nesting season, averaged across each area. See Table 1 for other characteristics of the farming areas. Bar = 500 km.

**Healthy**  
**Chalkbrood**  
**Pollen Ball**  
**Other**

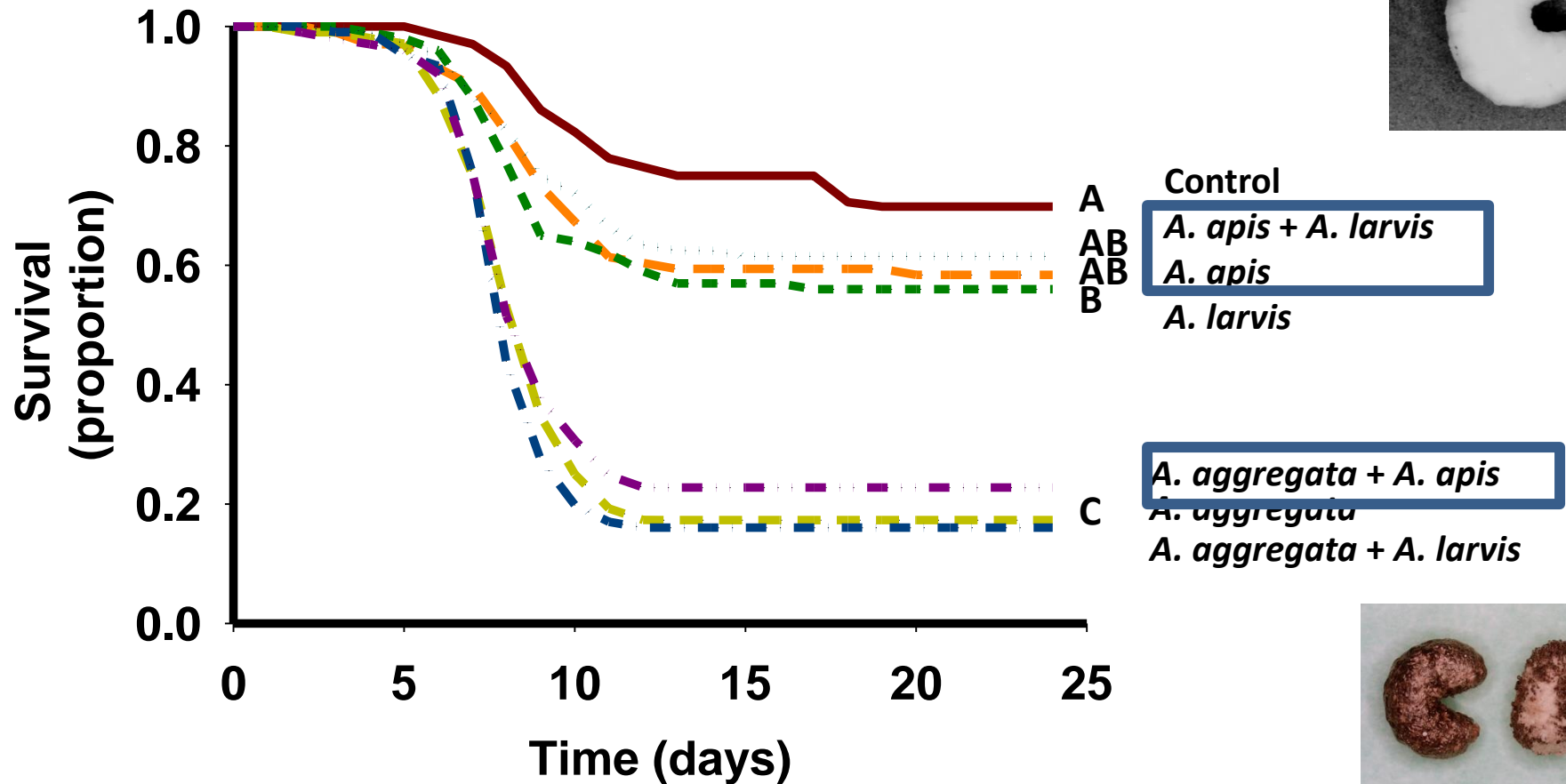
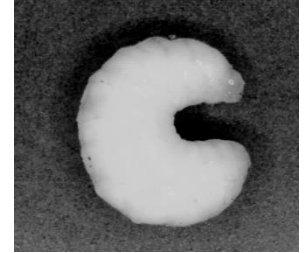
**Up to 25% of  
 chalkbrood larvae  
 had more than one  
 fungal species  
 infecting it**

# Leafcutting bee survival





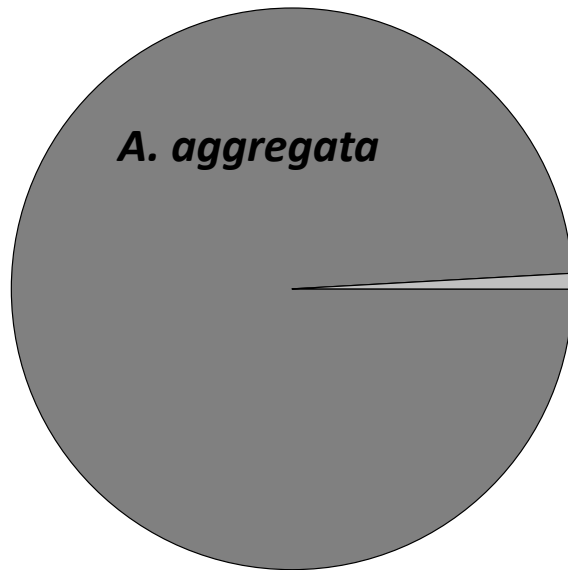
# Leafcutting bee survival



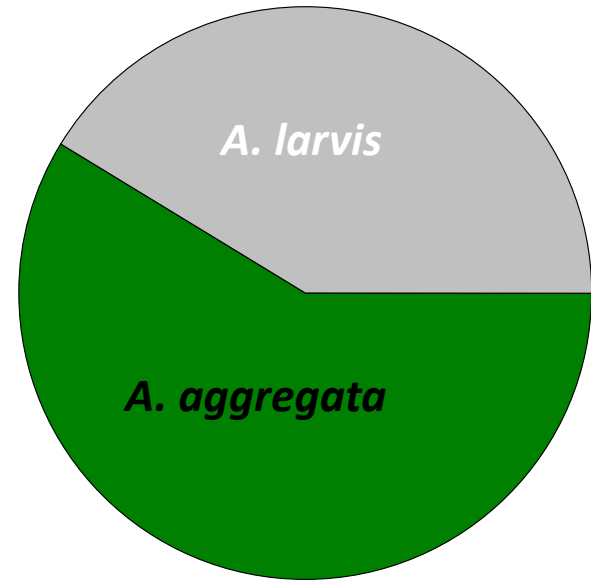


## ALCB

Average amount of fungal material  
(nuclei per bee)



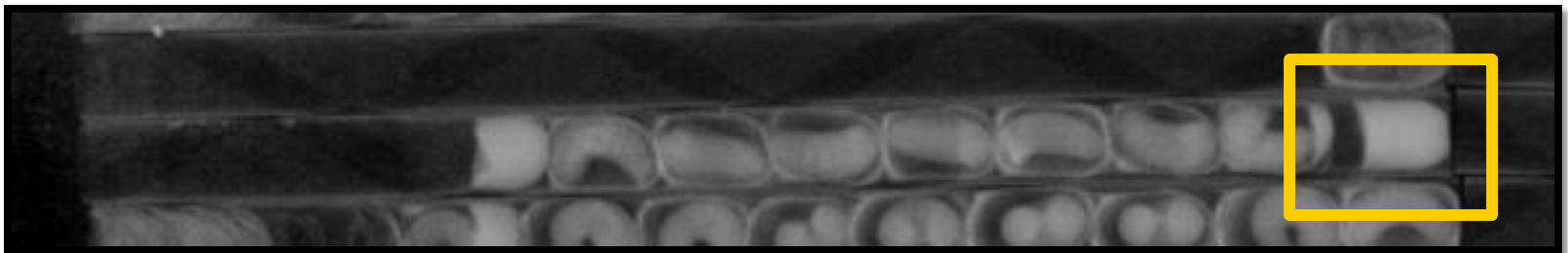
*A. aggregata* + *A. apis*

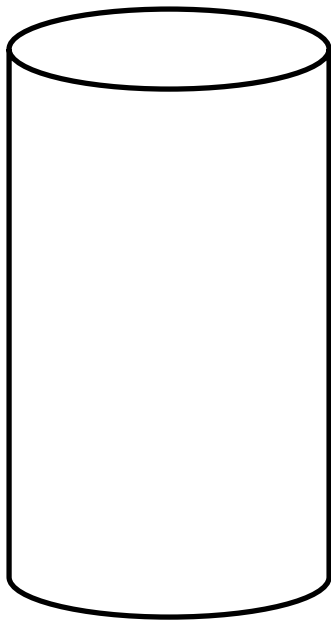
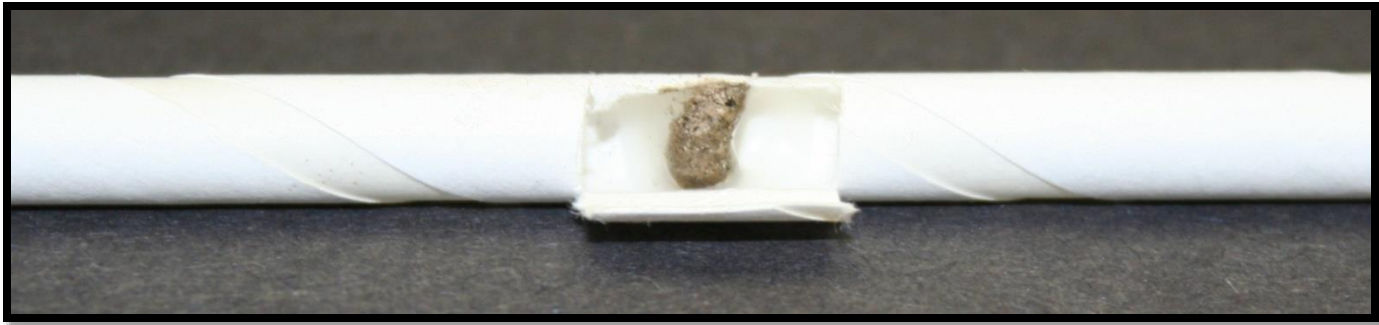


*A. aggregata* + *A. larvis*

# Behavior study

- Are there any unique behaviors in ALCB elicited in chalkbrood environments?
  - Specifically more failed nests (pollen ball)?





Control



Infective



Autoclaved

- 100 straws per treatment

- Female bees placed in back of straws

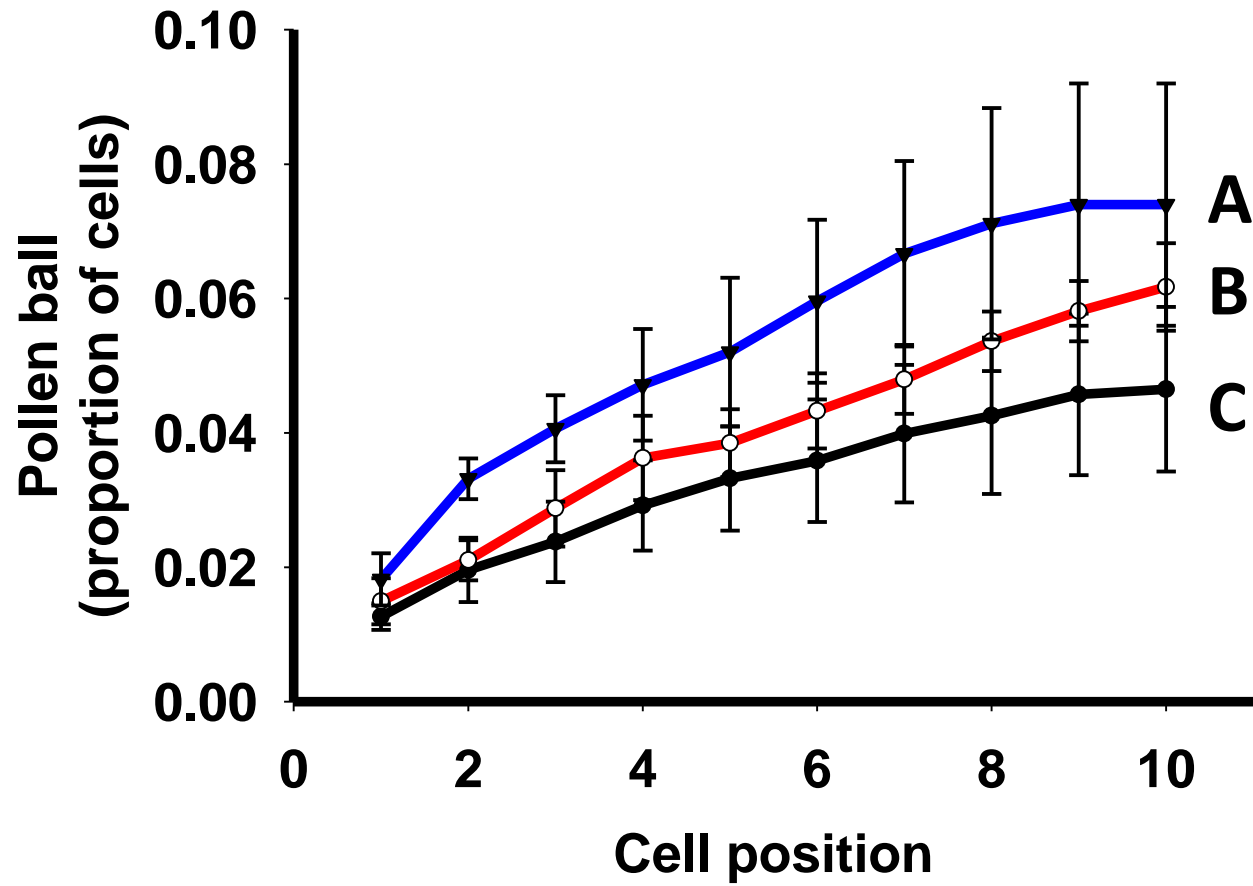
- 3 shelters per year

- 3 years



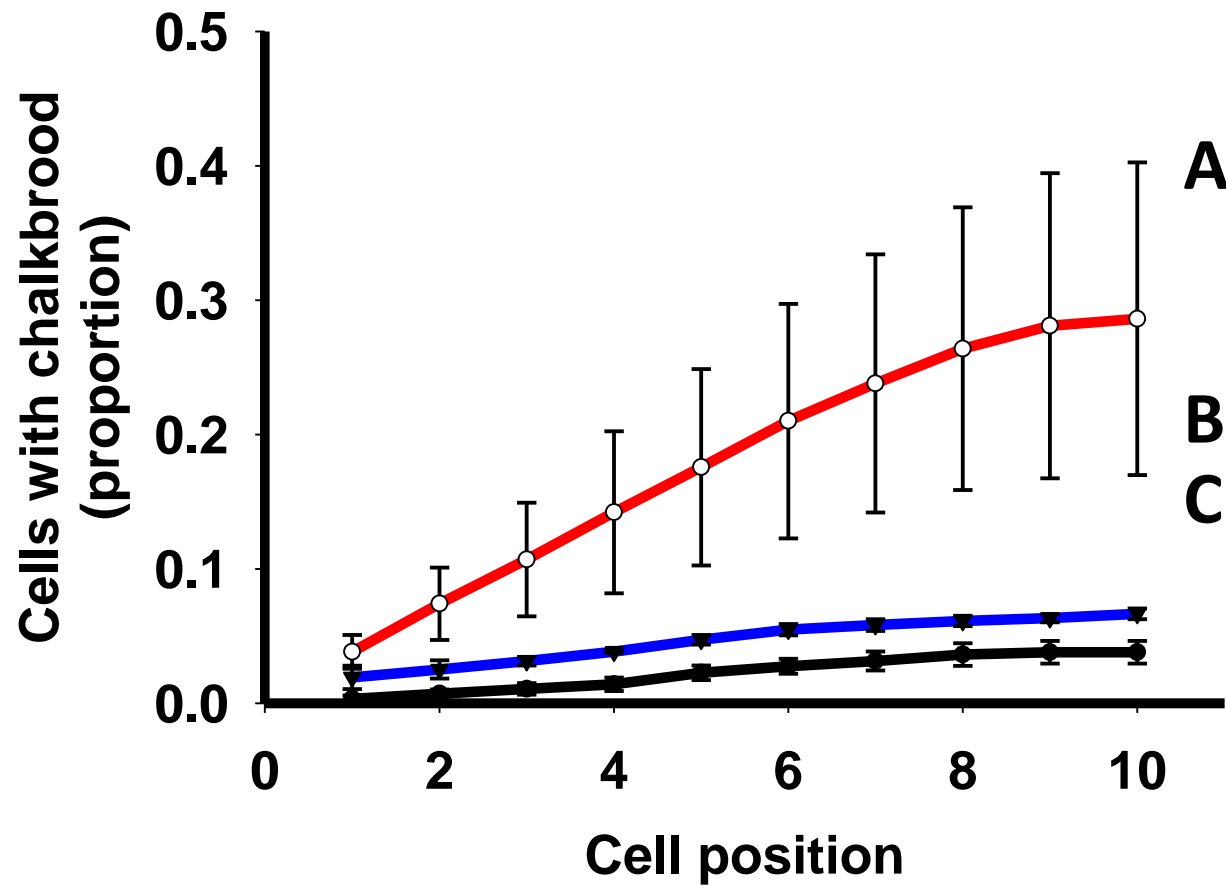


## Pollen ball



- ▼— No cadaver
- Autoclaved cadaver
- Infective cadaver

## Chalkbrood



- ▼ No cadaver
- Autoclaved cadaver
- Infective cadaver

- Identify causes of “other” death
- Exploit dual infections?
- Honey bee chalkbrood not a concern
- ALCB behavior