

ABSTRACT

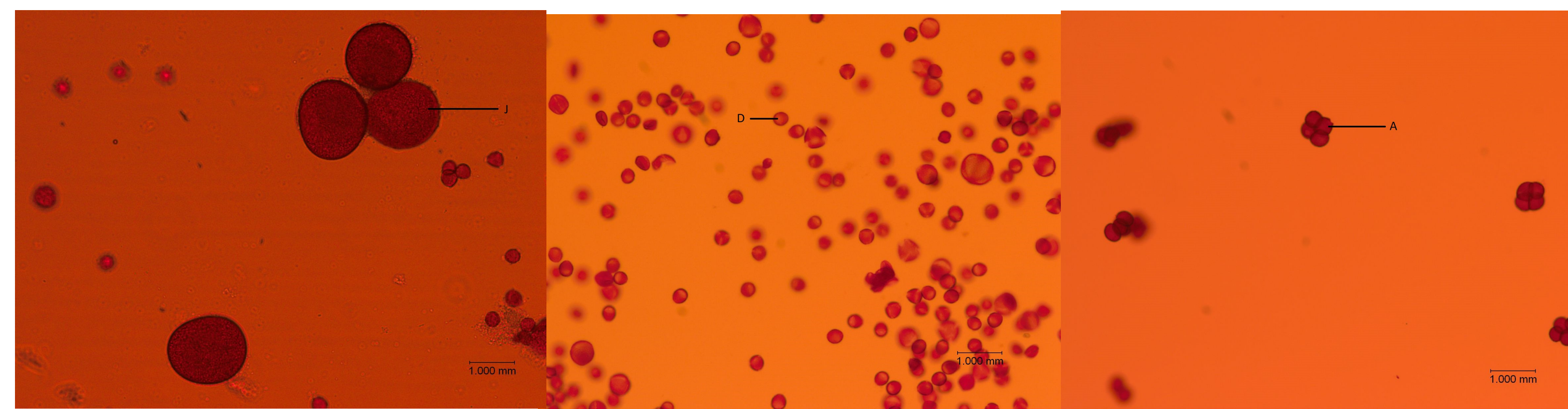
Bumblebees, along with other pollinators, aid the reproduction of 30% global crops and 90% wild plants. With the global decreases of pollinator populations and increased agricultural development, bumblebee domestication has become commercialized. Bumblebees raised in the wild and those grown in greenhouses have been largely assumed to have identical pollen-collecting behavior, but there have been no studies directly examining if this is true.

RESEARCH QUESTIONS

1. Do wild and domesticated *Bombus impatiens* bumblebees differ in the pollen morphologies that they collect, or the number of grains of each morphology?
2. Does floral constancy of wild and domesticated bumblebees vary?

HYPOTHESIS

Variations in behavior and resource needs between domesticated and wild bumblebees will create a difference in the number and types of pollen collected, and floral constancy will consequently deviate.



METHODS

- 4 domesticated bumblebee nests
- 4 wild bumblebee nests

25 worker bumblebees per nest sampled (200 total)

The pollen samples were individually centrifuged in ethanol and added to fuschin gel, then plated on a microscope slide

200 grains of pollen counted per slide

Using the statistical program R, the data was analyzed and modeled as follows:

Research question 1: Zero-inflated negative binomial model

Research question 2: Gaussian model



RESULTS

Research Question 1:

2/13 morphologies are collected to a marginally significant different amount by wild and by domesticated bumblebees

There is no difference in how many pollen grains of each morphology are collected by wild and by domesticated bumblebees

Research Question 2:

Floral Constancy:

Domesticated: 68.7%

Wild: 79.9%

DISCUSSION

The morphology of the pollen collected by domesticated and wild bees appears to differ to a slight extent, although the number of grains of pollen of each type of morphology does not vary with domestication status. Floral constancy differs significantly, which could signify domesticated bumblebees to be less efficient at collecting pollen, but we did not determine a causation pattern, only a correlation. Future studies could determine the effect of domestication upon bumblebee behavior by domesticating part of a wild colony after some time spent in the wild.

ACKNOWLEDGEMENTS

I would like to thank Genevieve Pugesek and Dr. Crone for their support and patience throughout the whole project; Appleton Farms in Ipswich, MA for providing an invaluable research site; and the Summer Scholars program for funding this research.

EFFECTS OF BUMBLEBEE DOMESTICATION ON POLLEN COLLECTION

by Carolyn Burtt