

Peeking into the honey bee gut : Understanding *Nosema* infection in honey bees  
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April 6, 2022

Presentation Script

Did you know that one in every 3 bites of food you take is thanks to honey bee pollination? Honey bees are essential to agriculture, ecosystem and revenue production across the globe. It has been sad to see the decline in honey bee health due to emerging pests and pathogens. In particular, I want to highlight this highly infective spore shown in the middle panel called *Nosema*, which weakens bee immunity and not only makes colonies sick, but susceptible to a host of other diseases as well. *Nosema* infection is identified as one of the most prevalent diseases in honey bee colonies all across the globe. What's worse? we don't know the mechanism by which it does this, and we don't yet have a safe treatment for it. For my PhD thesis, I wanted to find answers by looking at changes to the honey bee gut protein interaction network.

Honey bees, like other organisms, are made up of proteins which we refer to as the functional products of genes. A gene contains instructions, and the protein linked to that gene carries out those instructions in the body. But proteins don't carry out these functions alone. Rather, they collaborate with other proteins and we can draw a wiring diagram depicted on the right, to reflect this which we call the interactome. So When bees get infected, the interactome is disrupted. This is because whatever is causing the disease is interrupting the protein interactions within the interactome.

To find out how the bee interactome changed upon infection, I had to figure out what the interactome looked like in the first place, so I decided to take a peek. To do this, I dissected some bee guts from our UBC colonies. Then I used a method called chromatography to isolate the interacting proteins from the guts. After this, I identified all the proteins in my sample using a powerful analytical tool called mass spectrometry. Finally, using some computer algorithms, I was able to predict with accuracy which proteins were interacting with each other, kind of like assembling puzzle pieces together.

This is really exciting because with the work I have done, we now have the first ever peek at the honey bee gut interactome. I am now using this resource as a basis for studying how the interactome changes when bees are infected with *Nosema*. I am glad that the results of my research will be important in identifying potential treatment targets in the development of safer and better targeted therapies for *Nosema* infection in honey bees.