

Natural Infection in Honey Bee Hemocytes

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Honey bees act as the primary pollinators of plants including fruit, nut, and vegetable crops. Since 2006, however, viral and other pathogens have caused honey bee colony losses averaging 33% annually (Lee et al, 2015). In an effort to better understand how the immune system of honey bees works, especially honey bee antiviral responses, I am investigating natural infection in honey bee larvae and in isolated hemocytes, which are macrophage-like immune cells. It was discovered that fruit fly hemocytes remained uninfected in virus-infected larvae, since hemocytes are important in mediating antiviral responses (Tassetto et al., 2017). The goal of this research project was to determine if these cells may also remain free of viruses in otherwise infected honey bee larvae and, thus, play an important role in honey bee antiviral defense. RNA was extracted separately from larval carcasses and hemocytes and cDNA was made, which was then screened for eight different honey bee viruses to determine the presence of viruses in the hemocytes and in the cells that make up the carcass. I found that in naturally infected larvae, hemocytes are generally uninfected. Of 39 larvae, 13 had natural infections. Three of the eight viruses were responsible for these infections. Of these 13 infected larvae, the hemocytes of only one larva was infected with the same virus that had infected the larva. Further experimentation will include testing hemocytes and carcasses from a larger sample of naturally infected larvae and from adult honey bees that will be injected with flock house virus. This will help determine if adult honey bee hemocytes are similarly resistant to viruses as larval hemocytes. Should hemocytes remain uninfected in otherwise infected larvae or adult bees, they may be a useful model for studying infection and the resulting antiviral response in honey bees at a cellular level.