

Is there a pot of honey at the end of the rainbow? An iridescent virus linked to colony collapse disorder

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A recent study by Jerry Bromenshenk and co-workers from the University of Montana claims to have found a link between colony collapse disorder (CCD) and the presence of a particular virus and also the presence of the parasitic fungus, *Nosema*.

The study reported in the journal, PLoS ONE, investigated 'strong, failing and collapsed' honeybee colonies from various regions in the United States as well as reference colonies where no CCD had



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Larvae of *Galleria mellonella*.
Upper Healthy and Lower
specimen infected with iridovirus.

Photo Dr Trevor Williams,
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(IIV) in the colonies studied, with higher levels seen in the failing and collapsed colonies. The iridoviruses were named as such due to their ability to cause a brightly-coloured iridescence in infected tissues. They are in a different family to other commonly encountered honeybee viruses such as DWV, ABPV, BQCV, Sacbrood virus (SBV) and chronic bee paralysis virus (CBPV), being larger in size and containing

been reported, from Australia and Montana. They used a method to quantify levels of different proteins in honeybee, finding a variety of proteins in the colonies including those relating to well known honeybee viruses, such as deformed wing virus (DWV), acute bee paralysis virus (ABPV) and black queen cell virus (BQCV). Interestingly they also found the presence of an iridovirus



Larvae of the gnat *Aedes aegypti*
Upper infected with Iridovirus;
Lower healthy

Photo Dr Trevor Williams

different genetic material, DNA instead of RNA. Iridoviruses are known to infect honeybees, with the *Apis iridescent virus* (AIV) isolated from the Asian honeybee, *Apis cerana*, by Bailey and co-workers in 1976, however, Bromenshenk's team cannot be sure whether they have found the same virus in the colonies sampled in this study. As well as this discovery, they report higher levels of *Nosema*-related proteins in the failing or collapsed colonies, but they could not be sure which species of *Nosema* they related to.

To further investigate their findings they regularly collected samples from a colony that was undergoing CCD and analysed the levels of *Nosema* and IIV-related proteins. They observed that as CCD progressed the number of foraging flights decreased and with this they reported an increase in IIV and *Nosema*. They also ran feeding experiments on honeybees to further analyse the interaction between these disease agents and the honeybees. To do this they fed honeybees the *Nosema* species, *N. ceranae* and the iridovirus strain IIV-6 as these were thought to be most similar to the pathogens they had detected in the colonies. They reported higher death rates in the bees fed both IIV and *Nosema* together compared to when they were fed separately, or not at all.

The scientists conclude that IIV is important to study further in order to understand its potential role in CCD and they are currently undertaking new experiments to isolate the virus. So, this study has defined another possible factor in contributing to the onset of CCD, again highlighting the complexity of this disorder. Although it is still unclear exactly what is happening in these colonies which suffer CCD, the continuous research into this area may finally help us to understand and ultimately prevent CCD.

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