

Study shows dangerous bee virus might be innocent bystander

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Professor Madeleine Beekman with beehives. Credit: University of Sydney

Researchers at the University of Sydney have found that the relationship between the tissue-sucking *Varroa* mite and virulence of a virus of

honey bees, has most likely been misunderstood.

The study challenges the long-held belief that the parasitic *Varroa* mite—a mite that sucks the tissue of honey bees—transmits the Deformed Wing Virus of honeybees and in doing so changes the [virus](#) to make it more virulent and deadly.

Research published today in *Proceedings of The Royal Society B: Biological Sciences* concludes that this belief is incorrect.

"The prevailing wisdom is that the mite selects for very virulent strains of the virus," said Professor Madeleine Beekman from the School of Life and Environmental Sciences at the University of Sydney.

"For that reason, the virus is now known as a very dangerous virus and the Australian beekeepers are adamant this virus should not get into the country. In fact, there is legislation that prevents the import of any bee products that could contain the virus. But our work shows that the virus is more likely to be an innocent bystander."

Australia is the only country in the world to remain free of the *Varroa* mite. This makes Australian honey and wax valuable because it is free of chemical residues used to eliminate the parasite.

"Australia is the last country on the planet to produce completely pure honey," says Professor Beekman. "But the mite is highly likely to arrive in Australia on shipping containers so we need to understand how the mite and the virus interact."

Professor Beekman and her team in the Behaviour and Genetics of Social Insects Lab injected honey bee pupae with high levels of Deformed Wing Virus which is carried by the mite to test if the virus was highly virulent due to changes in the transmission route that

occurred via the *Varroa* mite.



Honey bee with *Varroa* mite parasite. Credit: Pixabay

In the absence of the mite, the virus needs to be transmitted to other bees via direct interactions between an infected and non-infected bee. *Varroa* does the transmission by biting one bee and then another.

The team found the transmission route used by the *Varroa* mite selects against viruses that are much more virulent than the Deformed Wing Virus, such as Sacbrood virus and Black queen cell virus. These viruses normally suppress Deformed Wing Virus. The elimination of Sacbrood and Black Queencell virus leaves just Deformed Wing Virus, which does

not kill the bees.

"Our work therefore changes our understanding of the effect *Varroa* has on Deformed Wing Virus and the health of honey bee colonies," Professor Beekman said.

"It means we don't have to be scared of the virus. Instead we need to focus on eliminating the mite and reducing its numbers."

The results will also have an impact on the ways the Australian beekeepers can prepare themselves for the arrival of *Varroa*.

"Many countries actively select for honey bee populations that can tolerate the *Varroa* mite without treatment. Australian beekeepers would like to import the sperm from such populations to start preparing their honey bees for when the [mite](#) arrives," said Professor Beekman.

"But the importation of the sperm is currently forbidden because of the threat of Deformed Wing Virus, which can be present in bee sperm. Perhaps beekeepers can now convince the authorities that bee sperm is safe."

"If we want to protect the bees, it now no longer seems to make sense to try to combat the virus," said Professor Beekman. "Instead, there needs to be a renewed focus on ensuring the number of mites in [honey](#) bee colonies remain low."

More information: Direct transmission by injection affects competition amongst RNA viruses in honeybees, *Proceedings of the Royal Society B*, [rspb.royalsocietypublishing.org1098/rsob.2018.2452](https://rsos.royalsocietypublishing.org/doi/10.1098/rsob.2018.2452)

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