

Bloodsucking mite threatens UK honeybees

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Classic symptoms of DWV include: stunted abdomen and incompletely developed wings. Credit: Professor David Evans, University of Warwick

Scientists have discovered how a bloodsucking parasite has transformed Deformed Wing Virus (DWV) into one of the biggest threats facing UK honeybees.

Honeybees are a key pollinating insect, adding around \$40Bn globally to crop value. Over recent years the spread of parasites and the viruses they transmit has resulted in high overwintering colony losses.

New and emerging threats to [insect pollinators](#) are putting increasing pressure on the agricultural sector to meet the demands of a growing population.

DWV is one of the most common viruses infecting European honeybees. Although present in almost all colonies, high levels of deformed wing disease – characterised by developmental deformities, reduced foraging ability and longevity – are only common when *Varroa* is also present.

Researchers at the University of Warwick have discovered how the disease is amplified in the presence of *Varroa destructor*, a tiny parasitic mite invading hives across the globe.

In colonies free from *Varroa*, DWV is present at very low levels and generally causes symptomless infections. However, the team found that when *Varroa* feeds on honeybee haemolymph ('blood'), specific virulent strains of the virus are transmitted and amplified, explaining why colonies infested with the mite suffer most severely.

The researchers also demonstrated that direct injection of a mixed DWV population in the absence of the mite, resulted in the same virulent strain being amplified – suggesting that this route of virus transmission bypasses the insect's anti-virus defence systems.

Professor David Evans, from the University of Warwick, who led the study explains: "We found that a harmful variant of the virus only multiplies rapidly if it is directly injected into honeybee haemolymph by *Varroa*. Once injected, the variant takes over. In mite-exposed bees, levels of this single virulent form can be 10,000 times higher than in the

absence of *Varroa*."

"Although exposure to *Varroa* caused disruption to a number of genes involved in the bee's immune response, it is the route of transmission which has caused this severe strain of DWV to become widespread."

The introduction and global distribution of the mite has had a significant impact on the health and survival of [honeybee colonies](#). The research, published today in the journal *PLOS Pathogens* could lead to informed breeding programmes for *Varroa* and virus resistance.

Professor Evans added: "Our results strongly suggest that DWV is widespread in UK honeybees – even where *Varroa* is absent. However, the identification of a single virulent form of the virus is an important step in developing strategies to boost honeybee health, to prevent colony losses and to safeguard this important pollinator."

The project is part of the Insect Pollinators Initiative, jointly funded by the Biotechnology and Biological Sciences Research Council (BBSRC), Defra, the Natural Environment Research Council (NERC), the Scottish Government and the Wellcome Trust under the auspices of the Living with Environmental Change (LWEC) partnership.

Professor Jackie Hunter, BBSRC Chief Executive commented: "This important study, part of the BBSRC-supported Insect Pollinators Initiative, provides important clues that could help to protect honeybee colonies. We rely on bees and other insects to pollinate food crops. We must sustain a healthy and diverse population of pollinating insects to ensure that we have enough food for the future."

More information: The paper "A Virulent Strain of Deformed Wing Virus (DWV) of Honeybees (*Apis mellifera*) Prevails after *Varroa* destructor-Mediated, or In Vitro, Transmission" is published in *PLoS*

Pathogens today.

Provided by Biotechnology and Biological Sciences Research Council

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