Virulence mechanisms of honeybee viruses

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Key words
Apis mellifera, colony losses, honey bee, Varroa destructor, viruses, pathogens, winter bees

Aim of the study
Here we investigated the role of viruses and other pathogens for losses of honeybee colonies, Apis mellifera.

Material and methods
This study was based on a sampling in China as well as on long term monitoring of differentially treated experimental field colonies and an apiary case study in Switzerland. Using several molecular and field techniques, we surveyed life expectancy of colonies and individual bees as well as pathogen loads and physiological makers.

Results and significance
We reported for the first time of Tropilaelaps mercedesae as a vector of viruses. Furthermore, we streamlined the sampling for honeybee RNA virus analytics. Moreover, we demonstrated the interference of ants with pest diagnosis as well as identified predictive seasonal markers for honeybee colony death at both colony and individual bee level (Deformed wing virus, Nosema ceranae, Varroa destructor, Vitellogenin and Acute bee paralysis virus). We also showed that Deformed wing virus and Varroa destructor significantly reduce life expectancy of winter bees. We further suggest to redefine the previously reported clinical symptoms of CCD (Colony Collapse Disorder) and reported on the role of drifting. Finally, we were able to show for the first time that trypanosomatid parasites are ubiquitous in Apis mellifera, which are completely not understood. Our results will help to reduce the detrimental impact of bee losses in Switzerland and worldwide and will form a solid basis for hypothesis-driven research.

Publications, posters and presentations
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Dainat, B.; Evans, JD.; Chen, YP.; Neumann, P.(2010) Honey bee drifting in Winter under infection pressure: a surviving mechanisms?
Dainat, B.; Evans, JD.; Gauthier, L.; Neumann, P. (2010) Ubiquitous occurrence of trypanosomatid parasites in honeybee colonies, Apis mellifera L., in prep.)
10 conference proceedings
16 publications in Beekeeping journals (in I, F, D).

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