

## CAN TRANS-GENERATIONAL IMMUNE PRIMING BE USED TO PROTECT HONEY BEES AGAINST EUROPEAN FOULBROOD?

Ory Florine<sup>1,2</sup>, Duchemin Vincent<sup>1,2</sup>, Kilchenmann Verena<sup>1</sup>, Charrière Jean-Daniel<sup>1</sup>, Dainat Benjamin<sup>1</sup>, Diemann Vincent<sup>1,2</sup>

1 Swiss Bee Research Centre, Agroscope, Bern, Switzerland

2 Department Ecology and Evolution, University of Lausanne, Lausanne, Switzerland

European foulbrood (EFB) is a disease affecting honey bee brood, and is caused by the bacterium *Melissococcus plutonius*. *M. plutonius* is distributed globally and causes EFB with regionally varying prevalence. In many countries, treatment of EFB with antibiotics is prohibited. EFB outbreaks must be reported to veterinary authorities and require costly intervention, sanitation and control measures. In order to provide beekeepers with sustainable tools to prevent EFB and to reduce the costs associated with EFB outbreaks, we tested whether the honey bee's own immune priming system could be exploited to protect the colonies against *M. plutonius* infections. Trans-generational immune priming is a natural mechanism transferring the immunological experience of parents to their offspring, leading to the latter's protection against infections. Our aim was to test whether natural or experimental exposure of honey bee queens to *M. plutonius* reduced the susceptibility of their brood to infection by this pathogen. The survival rates of *in vitro* reared brood produced by previously exposed or non-exposed queens and inoculated with *M. plutonius* were compared in order to assess the degree of protection conferred by the previous exposure of the queens. We also determined whether this exposure resulted in individual or colonial fitness costs. Our results showed no fitness costs of queen exposure to the pathogen, but provided no evidence of trans-generational immune priming. Neither natural nor experimental exposure induced protection of honey bee brood against *M. plutonius* infection. Our choice of queen exposure by feeding, which could be easily performed by beekeepers for colony health management, may have prevented immunisation. Immunisation might be achieved under different priming procedure, which should be identified to achieve a biologically relevant effect, while ensuring that the costs to the health and fitness of the queen and colony remain minimal.

**Keywords:** Honey bee health, European foulbrood, Trans-generational immune priming