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Honey bee resistance to varroa mites: insight into the complex nature of the SMR trait

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Background and Purpose
The parasite Varroa destructor is a major threat to the honey bees (Apis mellifera) and to beekeeping worldwide. Specific honey bee population have developed resistance to the parasite and are able to regulate the growth of the varroa population within the colony, without the required use of mite-control pesticides. These populations can have different host traits that affect the varroa-load inside the colony but a common similar feature in many of them is the SMR trait (Suppressed Mite Reproduction). Recent studies have shown that a modification of the pheromonal bouquet of pupae could potentially be linked to the disruption of varroa reproduction. However, this pheromonal bouquet is used by brood to communicate with adult bees. The aim of this study is to observe whether adults in colonies with high SMR expression are more or less sensitive to pupal pheromones than non-SMR colonies.

Methodology
We compared how bees from SMR and non-SMR colonies react to pheromones at different concentration using simple olfactory learning tasks with the proboscis extension reflex.

Results and conclusions
This study will deepen our understanding of the communication between individuals in the colony and potentially open new perspectives on understanding how honey bee colonies develop unique traits of mite resistance.

Practical implications for beekeepers
The long-term aim of this study is to develop sustainable long-term strategies for mite control with mite-resistant honey bees. Understanding the underlying mechanisms of the SMR trait will help to develop new technology used in identifying and breeding for disease resistance.