When testing for mechanisms underlying the reduced infestation increase, it was found that in the TG a very strong reduction of mite fertility and fecundity was the dominant factor, but in the AWD mite reproduction only slightly decreased. In contrast, the AWD bees showed a high degree of Varroa sensitive behaviour (VSH), which was absent in the TG. The VSH research is presented by Delphine Panziera in a separate talk. Grooming of dust as well as mites was tested in the laboratory as well as in (broodless) colonies, in general grooming activity was lower in the selection groups compared to controls.

It is striking that despite an equal approach in two groups only ~80 kilometres apart such different mechanisms are selected by nature. It shows that resistance (and tolerance?) can be based on different mechanisms depending on for instance starting population and environmental factors.

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Keywords: survival; vitality; mite reproduction; grooming; hygiene

6.10. Artificial uncapping of brood cells affects the infestation and reproduction of Varroa destructor.

Künstliches Entdeckeln von Brutzellen beeinflusst den Befall und die Reproduktion von Varroa destructor.

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Varroa sensitive hygiene behavior can strongly contribute to the resistance of A. mellifera towards Varroa destructor infections. It affects the reproductive success of mites inside the brood which is till now explained by selective removal of brood with fertile mites while non-reproductive mites are often neglected.

To test the effect of artificial uncapping on mite reproduction and infestation rate sealed brood combs were partly opened about 3 to 7 days post natural capping, while other parts of the brood cells remained untouched to serve as control. After treatment, the combs were immediately returned to either the original colony or a partner colony with different mite infestation level. 3-10 days later the combs were removed and frozen until cell by cell evaluation for the infestation with foundress and offspring mites in relation to the age of the bee pupae. Altogether, 48 brood samples with a total of 4536 treated and 5750 control cells were tested at the institutes in Kirchhain and Osijek in 2013-2015.

Most of the uncapped brood was recapped by the bees within some hours. No significant difference of the brood infestation rate between treated and control cells was observed if the combs were returned to their original hives. However, if introduced to
higher infested partner colonies the infestation level of the treated cells was increased compared to the control while it was decreased if the brood was given to less infested colonies. With an average 40.7%, the rate of non reproductive mites was significantly higher in treated cells compared to 24.1% in the control cells.

Obviously, foundress mites do leave and invade brood cells during uncapped periods of the pupal stage which will disturb its synchronisation with the brood development and lower its reproductive success.

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Keywords *Varroa destructor*, mite reproduction, brood uncapping, hygienic behavior, resistance

6.11. Mating disruption of the honeybee mite *Varroa destructor*: evaluation of different application techniques and the duration of action.

Paarungsstörung bei der Bienenmilbe *Varroa destructor*: Beurteilung verschiedener Applikationstechniken und der Wirkdauer.

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Mating in the mite *Varroa destructor* takes place within the sealed brood cell of its honeybee host and is triggered by a female sex pheromone consisting of 3 fatty acids and the respective ethyl esters. Thereby, the single components as well as the mixture can elicit the male mating behavior. In previous studies we showed that spraying the main component oleic acid to a brood comb prior to the *Varroa* infection leads to a reduced number of mated females inside the brood cells. We now tested different application methods and compositions: (1) oleic acid was added to the melted bees wax before making the comb foundation (2) oleic acid was sprayed directly on the wax foundation (3) oleic acid was sprayed on capped brood cells and (4) a mixture of all 6 components was sprayed on empty brood combs. The combs were artificially infested with phoretic *Varroa* females at the time of cell capping. The daughter mites were collected 12 days later from the hatching bees and spermatozoa in these females were counted. Furthermore, we used approach (2) (oleic acid sprayed on a wax foundation) to analyze the number of transferred spermatozoa over three successive brood cycles.

We could show that the number of transferred spermatozoa is reduced when oleic acid is added to the wax or sprayed on it (approach 1 and 2), and that up to 20% of the daughter mites were unmated. The mixture of all 6 components did not improve this effect. However, there was no effect on the mating success of *Varroa* mites when oleic acid was sprayed on capped brood cells. Our tests also revealed that the rate of unmated female mites decreases slightly with every brood cycle, possibly because of a barrier effect of the remaining skins of bee larvae from previous brood cycles. A practicable application with a long-lasting effect is still the crucial limitation for the use of