

## **Abstract**

The honeybee is one of the model species in insect olfaction and its sense of smell is well studied. However, knowledge about the spectrum of odorants detectable *to* honeybees is limited. One class of odorants that has never been tested so far are the amino acids, which are important constituents of floral nectar. The experiments reported here were conducted in order to (1) determine if the odor of amino acids is detectable *to* honeybees (*Apis mellifera*), and (2) determine olfactory detection thresholds in honeybees for detectable amino acid odors. To this end, the proboscis extension reflex, a classical conditioning paradigm that takes advantage of the honeybee's ability to build a robust association between an odor stimulus and a nectar reward, was used. The results demonstrate that five out of 20 amino acids presented at 100 mM were detectable. The honeybees' median olfactory detection thresholds for these five amino acids are 12 mM for L-tyrosine and L-cysteine, 50 mM for L-asparagine and L-tryptophan, and 100 mM for L-proline. These threshold values are high in comparison to naturally occurring concentrations in floral nectar, and compared to threshold values obtained in vertebrate species. One possible explanation for these findings is that the size of the olfactory receptor repertoire of honeybees limits their olfactory capabilities in terms of detectability and sensitivity for the odor of amino acids.

### **Keywords:**

amino acids, olfaction, *Apis mellifera*, honeybee, proboscis extension reflex, olfactory detection threshold, classical conditioning.