**Sugar perception and plasticity in antennal system of the honey bee**

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Sugar is one of the most important stimuli affecting honey bee behaviour. An overview over behavioural, physiological, and neuroanatomical properties of the gustatory system of the honey bee will be presented with particular reference to the antennal system. Behavioural strategies of assessing sugar stimuli by antennal movements and the resulting consequences for natural stimulus conditions for the sensory organs are discussed as well as the influence of the decision to display a proboscis extension response (PER). The response properties of taste hairs and their projections in the CNS will be presented. These sensory foundations are the first stage in the processing of sugar stimuli that are generally used as unconditioned stimulus and reward in classical and operant conditioning paradigms in bees, but can also be used to investigate non-associative plasticity. Antennal movements, which can be directly influenced by antennal sugar stimuli display habituation just like the PER. However, it is also possible to condition antennal movements operantly in a side-specific manner. The conditioning of antennal movements can be reduced to an antennal muscle controlled by a single motor neuron. In this paradigm, it could be shown that there is a strict side-specificity also for the unconditioned stimulus.