

P026*Floral odours are learnt and processed via key odorants***Judith Reinhard**, Charles Claudianos

Pollinating insects such as honeybees have to detect, process and learn numerous floral scents from their environment during their daily foraging trips. Floral scents are complex mixtures of different odorants. How the bee brain unravels the complex information contained in scent mixtures and reliably discriminates different floral scents is unclear. Here, we investigated learning of complex odour mixtures in honeybees using a simple olfactory conditioning procedure, the Proboscis-Extension-Reflex (PER) paradigm. Restrained honeybees were trained to three scent mixtures composed of 14 floral odorants each, and then tested with the individual odorants of each mixture. Bees did not respond to all odorants of a mixture equally: They responded well to a selection of key odorants, which were unique for each of the three scent mixtures. Bees showed less or very little response to the other odorants of the mixtures. The bees' response to mixtures composed of only the key odorants was as good as to the original mixtures of 14 odorants. A mixture composed of the non-key-odorants elicited a significantly lower response. Neither an odorant's volatility or molecular structure, nor learning efficiencies for individual odorants affected whether an odorant became a key odorant for a particular mixture. Odorant concentration had a positive effect, with odorants at high concentration likely to become key odorants. Our study suggests that the bee brain processes complex scent mixtures by predominantly learning information from selected key odorants. We propose that the 'selection' of key odorants occurs via inhibitory neural mechanisms in the glomeruli of the antennal lobes.