Odor coding and neural plasticity in the mushroom body of the honeybee

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1. Gutachter: Prof. Dr. R. Menzel
2. Gutachter: Prof. Dr. C.G. Galizia

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Chapters I and II are based on the following manuscripts:

I. Population sparsening and temporal sharpening of olfactory representations in the honeybee mushroom bodies

P. Szyszka, M. Ditzen, A. Galkin, C.G. Galizia and R. Menzel

II. Associative odor learning in honeybees strengthens Kenyon cell activity in the mushroom body

P. Szyszka, A. Galkin, C.G. Galizia and R. Menzel

The contribution of the different authors was as follows:

I. I performed all experiments for PN bouton and KC measurements in the MB, performed all data analysis and wrote the manuscript. M. Ditzen performed some of the measurements of glomerular activity in the AL. A. Galkin calculated how many PN boutons have to be activated for one KC to fire. Experimental studies, data analysis and the manuscript were discussed with C.G. Galizia and R. Menzel.

II. I performed all experiments and all data analysis, and wrote the manuscript. Statistical analyses were discussed with A. Galkin. Experimental studies, data analysis and the manuscript were discussed with C.G. Galizia and R. Menzel.

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Abbreviations

2PLSM	2-photon laser scanning microscopy
AL	antennal lobe
cAMP	cyclic adenosine monophosphate
CCK	cholecystokinin
cKC	clawed Kenyon cell
CS	conditioned stimulus
CS-	unrewarded CS
CS+	rewarded CS
F	fluorescence
GABA	g-aminobutyric acid
KC	Kenyon cell
l-ACT	lateral antenno-cerebral tract
LH	lateral horn
LN	local neuron
m-ACT	medial antenno-cerebral tract
MB	mushroom body
MTC	mitral/tufted cell
OB	olfactory bulb
OC	olfactory cortex
ORN	olfactory receptor neuron
PC	pyramidal cell
PER	proboscis extension reflex
PKA	protein kinase A
PN	projection neuron
SEM	standard error of the mean
US	unconditioned stimulus
VUM	ventral unpaired median
LTP	long term potentiation