Nature Reviews Neuroscience | AOP, published online 17 January 2013

IN BRIEF

SENSORY PROCESSING

Itch-specific neurons

Dorsal root ganglia (DRG) neurons that respond to itchy stimuli also respond to painful stimuli, raising the question of whether any DRG neurons specifically mediate itch. The authors showed that MAS-related G protein-coupled receptor A3 (MRGPRA3)-expressing (MRGPRA3$^+$) DRG neurons selectively innervate the epidermis and respond to both itchy and noxious stimuli. *Mrgpra3* ablation in mice reduced itch behaviour but not pain behaviour, and selective activation of MRGPRA3$^+$ neurons with a noxious stimulus induced itch behaviour but not pain behaviour, suggesting that MRGPRA3$^+$ DRG neurons specifically mediate itch.

ORIGINAL RESEARCH PAPER Han, L. *et al.* A subpopulation of nociceptors specifically linked to itch. *Nature Neurosci.* 23 Dec 2012 (doi: 10.1038/nn.3289)

NEURODEVELOPMENT

A refining role for NMDARs

The role of NMDA receptors (NMDARs) in synaptic refinement during development is not well understood. Here, the authors used newborn mice with genetic mosaic deletions of NMDARs at vibrissal relay synapses in the ventral posteromedial thalamus (VPm), which undergo substantial postnatal refinement. At postnatal days 13–14, VPm neurons lacking NMDARs received input from more axons than control VPm neurons. They also had fewer AMPARs, suggesting reduced synapse strength. Thus, both pruning of redundant synapses and strengthening of remaining synapses were disrupted in neurons lacking NMDARs, indicating that NMDARs are required for synapse refinement during development.

ORIGINAL RESEARCH PAPER Zhang, Z.-w., Peterson, M. & Liu, H. Essential role of postsynaptic NMDA receptors in developmental refinement of excitatory synapses. *Proc. Natl Acad. Sci. USA* 31 Dec 2012 (doi:10.1073/pnas.1212971110)

SENSORY PROCESSING

Follow the smell

In *Drosophila* antennae, most olfactory receptor neurons (ORNs) send axons to both sides of the brain. So how do fruitflies know which way to turn in response to an asymmetrically presented odour? The authors showed that the axon branch ipsilateral to the ORN soma fires earlier and faster than the contralateral branch. Thus, an odour that stimulates one antenna more strongly than another results in faster and stronger activation of projection neurons downstream from the ORN branch ipsilateral to that antenna, which explains the flies' ability to lateralize odours.

ORIGINAL RESEARCH PAPER Gaudry, Q. *et al.* Asymmetric neurotransmitter release enables rapid odour lateralization in *Drosophila*. *Nature* 23 Dec 2012 (doi: 10.1038/nature11747)

COGNITIVE NEUROSCIENCE

Categorical continuity

How does the brain represent the numerous types of actions and objects that we can recognize? In this functional MRI study, subjects watched natural movies and linear regression models were applied to each voxel's response to 1,705 categories of actions and objects that appeared in the movies. The analysis revealed a continuous representation of categories that reflects the semantic similarity between categories rather than distinct areas representing specific categories.

ORIGINAL RESEARCH PAPER Huth, A. G. *et al.* A continuous semantic space describes the representation of thousands of object and action categories across the human brain. *Neuron* **76**, 1210–1224 (2012)