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Wednesday, November 28th 2012 • 14:30 (2:30 FNO – 01 / 117

LUCIA JACOBS

Department of Psychology, University of California, Berkeley, USA

Chemosensory cognition and the evolution of olfaction

The chemical senses of vertebrates present some of the most enduring mysteries of brain evolution. First, it is not clear why are there two olfactory systems: the main system (MOS), detecting odorants on the olfactory epithelium and projecting to the olfactory bulb, and the accessory system (AOS), detecting odorants in the vomeronasal organ and projecting to the accessory olfactory bulb. More perplexing, taxonomic patterns of olfactory system presence and size cannot be explained by any current hypothesis, whether behavioral or phylogenetic. Yet the two systems vary immensely in structure and complexity across vertebrates, particularly in primates. Rather than assuming that the size of an olfactory system scales with the need to discriminate a class of odorants, I propose a new hypothesis: that the MOS evolved as a navigation system, to map the aqueous chemical world experienced by the early vertebrates. I further propose that this function retained its primacy in land vertebrates, and that this spatio-temporal hypothesis of olfaction offers a new explanation for the patterns of neural architecture, plasticity and allometry of olfactory systems in vertebrates.

Host:

Denise Manahan-Vaughan
Department of Neurophysiology, Faculty of Medicine, Ruhr-University Bochum

Guests are welcome!

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International Graduate School of Neuroscience
Ruhr-University Bochum