Tim J. Jacob – Key reference

O'Connor, S. & Jacob, T. J. (2008). Neuropharmacology of the olfactory bulb. *Curr.Mol.Pharmacol., 1,* 181-190.

Notes: The olfactory bulb is located at the start of a hierarchical chain of sensory processing mechanisms. The relative ease of its isolation allows the possibility that models of these mechanisms might be integrated to develop a detailed understanding of function. In this sensory processing chain odour molecules evoke signal transduction in the olfactory receptor neurons. These signals represent the diverse range of molecular binding affinities of the olfactory receptor proteins. The first level of processing of this sensory input is performed by the neurons of the olfactory bulb. The olfactory system needs to filter the vast amount of sensory input it receives to be able to select the subset of biological significance. The importance of the olfactory bulb in this filtering process is suggested by its wide range of modulatory mechanisms. These mechanisms include an array of centrifugal inputs from other regions of the brain as well as numerous intrinsic feedback circuits. Given the complexity of the olfactory bulb and the range of its modulatory activity, the process of isolation of its components produces some difficulties of interpretation. This is mainly due to the removal of some of the effects of interaction and the change in balance that results. We present a summary of the current understanding of the interacting modulatory elements that are found in the olfactory bulb and a detailed account of the properties of mitral/tufted cells, the projection neurons of the olfactory bulb. This is followed by a discussion of the intrinsic and extrinsic modulatory systems acting on these cells. A consideration of the integration of the effects of these modulatory systems allows an understanding of how the output of the mitral/tufted cells is controlled. While significant progress has been made in the elucidation of the individual components as a result of advances in techniques over the last decade we suggest that there is a need for computational studies as a further aid to the understanding and interpretation of the weight of individual modulatory components in this dynamic interacting system

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