

“Systems neurobiology of the Platynereis larva”

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Abstract

Neural computations by nervous systems require proper synaptic connectivity between neurons. However, behaviour cannot be predicted from connectivity alone because a ‘chemical map’ of neuromodulation is superimposed upon the synaptic connectivity map. To understand animal behaviour the combined study of anatomical connectomes and neuromodulatory maps is needed. Currently such an integration at the whole-organism level has only been achieved in *C. elegans* and to some extent in *Drosophila*. To complement these conventional model organisms we have been developing the marine annelid *Platynereis dumerilii* into a powerful new experimental model. We study *Platynereis* from both connectomics and the neuromodulatory perspectives to understand how interactions between the nervous system and the environment shape behaviour, physiology and development. Given the phylogenetic position (within the lophotrochozoans) and ancestral neuron-type complement of annelids, by studying *Platynereis* we can also address key questions about nervous system evolution in a comparative framework (e.g. origin of sensory systems).