Evolution and Development of Cnidarian Neurons

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Master thesis in animal molecular biology

Questions about the evolution and development of nervous systems have captivated the attention of scientists for decades. These processes have been well studied in vertebrates and insects. However, they are still poorly understood in more early branching clades. In this master thesis, we used the cnidarian model organism *Nematostella vectensis* to first identify neuronal marker genes with single cell RNA sequencing data and in situ hybridisation (ISH) to better understand the composition of the *N. vectensis* nervous system. In this way we have found ten candidate neuronal markers which show a high degree of neural diversity. We then narrowed it down to the bilaterian head patterning gene *Six3/6* to assess its role on the patterning of the nervous system of *N. vectensis* by double fluorescent ISH and immunostainings. The results reveal two neuronal cell populations which are regulated by Six3/6. To further study *Six3/6*, we generated a transgenic line by injection of a Six3/6 promotor construct. Additionally, we used our optimized ISH techniques to test cell-type markers in *Isodiametra pulchra* revealing three different cell types. Together, these results advance the understanding of the characteristics and the development of the nervous system *of N. vectensis* and contribute to a better understanding of the origin of bilaterian features.

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