

P22. UNDERSTANDING THE CELL DIVERSITY OF THE SEA URCHIN LARVA: EMPHASIS ON THE NERVOUS SYSTEM & NOVEL NEURONAL SUBTYPES

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The nervous system of the sea urchin larva consists of a central ganglion of serotonergic neurons located in the apical organ (central nervous system) and sensory and motor neurons associated with the ciliary band and the gut (peripheral nervous system). Signals from these neurons enable the larvae to swim and feed. Although this system seems quite simple, recent findings suggest that is far more complex than previously described as neurons of the same type are expressing different toolkits of genes and secret different combination of neurotransmitters and neuropeptides. In addition, some of these neurons bear a pancreatic like molecular signature making this neuronal diversity even greater. The aim of our project is to dissect the gene regulatory networks (GRNs) that guide the differentiation of the neuropeptide expressing pancreatic neurons as well as to clarify their function in echinoderms. Moreover, we aim to investigate the cell diversity of the sea urchin larva with emphasis on the nervous system. To accomplish these, known gene markers of these neurons were knocked-down via specific morpholino injection and gene relations were drawn. To further investigate the GRNs of these neurons and their evolution, we are applying high throughput assays such as single cell RNA sequencing (scRNAseq) in the two different sea urchin species *Strongylocentrotus purpuratus* and *Paracentrotus lividus*. Using bioinformatics, we aim to recognize the factors that are pancreatic specific and key factors will be knocked down. The effect of each knockdown will be estimated by in situ hybridization and immunofluorescence of specific probes and protein markers respectfully. In this way will be able to provide insight, for the first time, into the molecular fingerprint of these cells and clarify how 'similar' or 'different' the nervous system of the two species is.

