

# MODELLING GENE REGULATION AND BIOMINERALISATION IN CNIDARIANS

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Rather than being directed by a central control mechanism, morphogenesis can be viewed as an emergent behavior resulting from a complex system in which several sub-processes on very different temporal and spatial scales (ranging from nanometer and nanoseconds to cm and days) are connected into a multi-scale system. The sub-processes like gene regulation, organic molecules interacting with the mineral deposition process, cellular processes, physiology and other processes at the tissue and environmental levels are linked.

In this seminar we will focus on cnidarians like the non-calcifying sea anemone *Nematostella vectensis* and the hydrozoan *Clytia haemispauca* and the calcifying scleractinian corals *Acropora millepora* and *Madracis mirabilis*. We will discuss methods for spatio-temporal modelling and inferring gene regulatory networks from gene expression data (qPCR data and in-situ hybridizations) and cell-based mechanical models of early embryogenesis. We will discuss methods for investigating biomineralisation in calcifying cnidarians. In corals we have been investigating the role of organic matrix involved in calcification and the development of skeletal micro-structures which evolve after settlement of the larvae. We will discuss a spatial model of calcification physiology and present a model of growth and form of corals and the impact of the physical environment.





