Modelling gene regulation of morphogenesis in the sea anemone Nematostella vectensis

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Abstract:

In this presentation we couple a model of gene regulation to a cell-based model of embryogenesis. In this case study we are collecting recently published spatio-temporal and quantitative gene expression patterns from various developmental stages in Nematostella in a spatial data base (``the virtual embryo''). We use this three-dimensional data for constructing a mathematical model of the regulatory network and for inferring regulatory network parameters. The regulatory network is modelled using a set of coupled reaction-diffusion equations, while the model parameters are inferred from the data base using optimization techniques. The regulatory network model is coupled to a biomechanical model of cell movement.