

Master students wanted: modeling biological systems in development

Life is complex. It represents the greatest challenge for scientists and all curious individuals in general. Live forms develop from a single cell, which divides. Every cell in our body is always produced from another cell. However, the processes of coordinating division numbers with patterning and migration of cells is still poorly understood.

To address this question we use Confetti model organisms (fish and mouse embryos), where we can assign unique colors to stem cells that will produce lots of fantastic and complex traced progenies in our body. We produce experimental data showing how stem cells divide clonally and fill the space while making organs, tissues and creating a defined shape, for example, the shape of our face.

In order to explore our hypotheses on patterns seen in the experimental data we would like to compare to mathematical modeling of cell division patterns associated with embryonic development. Basically, stem cells can be simplified and reduced to spheres that multiply in three-dimensional space with time, and the goal of our collaboration will be to develop the algorithms, data structure and visualization tools to run computer simulations of embryonic development. Introducing different parameters into such simulated system would enable us to define the role of cell-cell interactions, directional growth and also migration during body morphogenesis.

We are searching for highly motivated individuals (IT/mathematics master students), who wish to expand their knowledge into science of life and are ready to embark on this serious multidisciplinary project with focus on simulation and mathematical modeling.

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