

Introduction to Physics of Morphogenesis

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Cells and tissues change their shapes over time. Morphogenesis involve molecular motors, adhesion, friction, and, as a whole, auto-organisation over time with exquisite control in time and space. These phenomena are out-of-equilibrium and represent stimulating challenges to the physicists. Signaling pathways and molecular actors in the process are largely identified. Proteins and signaling events can be labeled fluorescently, and embryos or tissues *in vitro* can be followed over time with this mesoscopic framework - attractive to the biologists.

It is now possible to perform complete fluid dynamics experiments on the living matter through the acquisition of flows of cells during embryogenesis in a variety of model organisms. Measures of cell remodeling with imaging and mechanical tests allow to probe theoretical models, and such characterisations are associated with identification of the involved signaling pathways and their dynamics. An integrated vision is currently emerging with biological functions to phase transitions, and molecular identifications/quantifications of phenomenological parameters.

This introductory lecture will present experimental and theoretical concepts now available to this new field at the Interface between Physics and Developmental Biology with relevance to Medical Science.