

Dynamics of cellular materials : from cell mechanics to tissue shape

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During its metamorphosis, a fly changes from larval to adult shape within a few days. The morphogenesis of its tissues is determined by a coordinated collective cell behavior. In turn, the mechanics at the tissue scale feeds back on the cell level dynamics. In close interaction between biologists and physicists, we have investigated how genetics can affect these different scales. A general set of quantitative tools has been developed and tested on a simple model system: soap froth. It links the sub-cell scale, the cell dynamics, the level of the group of cells, and the whole tissue. Although the tissue is the seat of complex genetic and mechanic regulations, it can surprisingly well be described in terms of continuum mechanics.

