

INTERNSHIP AND PHD PROPOSAL

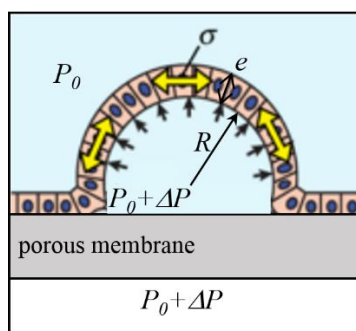
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Phase diagram of epithelial cells

Elucidating the various factors that determine the shape and shape changes of epithelial cells is a crucial point in understanding various biological processes, such as embryogenesis. The purpose of the proposed work is to measure a phase diagram for epithelial cells in culture, varying well-controlled parameters, and interpret the measurements in the frame of different possible modellings. Microprinting techniques will be used on porous membranes to obtain domes of epithelial tissue with controlled geometric properties to which pressure can be applied (see figures below). By using this type of experimental device, we hope to answer open-ended questions such as the existence and nature of phase transitions in the epithelium under applied mechanical stress, and decipher which parameters of the proposed models are the more relevant.



Top: domes in an epithelium of MDCK cells

Down: control parameters and measured quantities (modified from Latorre et al. Nature 2018)

The internship may continue with a thesis on a more general subject, dealing with the influence of mechanical and geometric constraints on the identity of epithelial cells.