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[912] Buckling of visco-elastic sheets in endocytosis and development

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Visco-elastic sheets have unique mechanical properties when it comes to understanding their deformation and topological changes. In the lab, we have studied the deformation of two biological visco-elastic sheets which have different spatial scales and characteristic visco-elastic times: lipid membranes, which are curved into membrane carriers in membrane transport, and epithelia, or cell monolayers, which curve and bend to generate organs such as the brain or the gut. We have found that a protein complex, called ESCRT-III, accumulates elastic stress while polymerizing as a spiral at the surface of lipid membranes, while an epithelium accumulates stress when encapsulated in an alginate hollow sphere, because of its proliferation. In both cases, the lipid membrane and the epithelium is deformed concomitantly to the release of the elastic stress, in a buckling process. I will discuss the similarities and the differences of this buckling mechanism observed at different biological scales.

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