

Plenary Lecture

## MODELLING THE ROLE OF CURVATURE ON TISSUE PATTERNING AND GROWTH

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**Summary:** It is well known that the physical environment of growing cells and tissues plays an important role on their behaviour. In particular recent research has shown that the curvature of a substrate can influence the growth of a tissue and also the organisation of the extracellular matrix that is produced by the cells. In this presentation we will use theoretical tools to explore experimental data of bone-like tissues growing on surfaces of constant mean curvature. Selective Plan Illumination Microscopy measurements of stained tissues show that the surface of a growing tissue closely approximates that of a Delaunay Surface. What is intriguing however is that the actin stress fibres within the tissue surface are helical and twist around the tissue surface. The helicity has similar aspects to that observed in the arrangement of collagen within and around osteons. In order to better understand this, we have developed a simple theoretical model to describe tensile fibres constrained within a fluid-like surface. The presentation will discuss aspects of this model and key questions that are still open in terms of understanding how cells can self-organise to produce complex tissues at large length scales.