Exploring tissue morphogenesis using optogenetics

We are inviting applications for a 3-year interdisciplinary studentship in the general area of Cell Biology and Biophysics to commence from September 2015. The students will be physically based within the state-of-the-art London Centre for Nanotechnology on UCL’s Bloomsbury Cell biology and Cell Biophysics infrastructure. Strong collaborative links with the Laboratory for Molecular Cell Biology at UCL and the Department of Engineering at Cambridge University will make this project truly multi-disciplinary.

The proposed research project aims at exploring tissue morphogenesis from the bottom-up using epithelial monolayers devoid of a substrate, live cell imaging, optogenetics, molecular cell biology techniques, and custom-designed mechanical testing equipment.

Epithelial monolayers are amongst the simplest tissues in the body, yet they play fundamental roles in adult tissues, where they act as physical and mechanical barriers to separate the internal environment from the external environment, and in development, when the intrinsic forces they generate drive morphogenesis. During development, tissue morphogenesis arises from the combination of a variety of individual cell behaviours such as oriented cell division, apical contraction, and cell intercalation. Similar cellular-scale behaviours also underlie the adaptation of tissues to changes in their mechanical environment. However, little is known about what mechanical forces and molecular processes act during each of these unitary cell behaviours and how they are integrated at the tissue-scale. We propose to explore these questions using optogenetic tools to control cell behavior and trigger tissue morphogenesis together with live cell imaging and Mechanical testing.

We are in search of a student to work towards the goals of this project. Candidates should have a high grade point average Bachelor’s degree or equivalent in subjects such as Molecular Cell Biology, Biophysics, Physics, or Engineering. This project involves a significant experimental component and previous experimental research experience relevant to the research project is desirable.

The stipend is £18000/pa and tuition fees will be covered. Funding is available to UK and EEA candidates.

Suitably qualified candidates interested in performing cutting edge research in a dynamic multidisciplinary scientific environment in order to understand tissue morphogenesis from the bottom-up should send their CV to Dr Guillaume Charras (g.charras@ucl.ac.uk).
References:


