



Applied and Computational Mathematics Seminar

Title: Applying mathematical models to biological systems: from embryo development to tumour growth

Speaker: Philip Murray, Centre for Mathematical Biology, Oxford University

Date: Thu 7th April 2011 at 2:15PM

Location: Mathematical Sciences Seminar Room

Abstract: The Centre for Mathematical Biology (CMB) at the University of Oxford is part of the Mathematical Institute and was established in 1983 as the first centre of its kind in Britain. There is a rich tradition within the group of modelling a variety of biological problems and in the first part of my talk I will very briefly summarise some of the work that is currently been undertaken.

I will then focus specifically on two areas on my own research. Firstly, I will introduce a patterning process called somitogenesis that arises during embryo development. I will present an outline of the current experimental understanding and motivate the need for mathematical modelling. Subsequently I will demonstrate how the underlying patterning dynamics can be described using Burgers' equation. Our model will be validated against data from a range of species and I will discuss how it can be further tested against experiment.

In the third part of the talk I will discuss how mathematical models can be used to model tumour growth. One of the problems that arise in this field is that experimental data is being increasingly generated at the discrete, cellular level of description but that when dealing with large numbers of cells it is preferable to describe a cell population as a continuum. I will investigate and discuss the merits of methods for moving from discrete to continuum descriptions of cell dynamics.

<mailto:Peter.Lynch@ucd.ie>