Hamilton Institute

Mathematical Modelling of Cell Signalling Systems: a useful tool for data integration and validation of hypotheses

Dr. Julio Vera

Systems Biology and Bioinformatics Group

Department of Computer Sciences

University of Rostock, Germany

Wednesday, October 3rd, 2007

Abstract:

The analysis of cell signalling systems through data-based models has emerged as a valuable tool to understand the underlying principles of protein interactions in cellular signal transduction. The complexity of such systems stems from a relatively large number of variables, the nonlinearity of interactions and difficulties in generating sufficiently rich, quantitative time series. In light of the complexity of cell communication systems, the role of mathematical models is to encode a hypothesis about the biochemical networks that underlie observations made in experiments. Depending on the details provided by measurements and the questions asked there are various levels at which one can establish a kinetic model, ranging from detailed representations of biophysical interactions among the components involved, to phenomenological representations of feedback mechanisms. Power-law formalisms provide a general framework, encompassing a range of "philosophies" by which differential equation models are specified. Recent investigations have suggested that power-law formalisms are a suitable tool to investigate the structure and behaviour of cell signalling systems (Vera et al. 2007).

In this talk I discuss the use of power-law models to study biochemical systems and show how prior biological knowledge and experimental data can be integrated to encode and verify hypotheses about signal transduction in living cells.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 3.00 - 4.00pm (followed by tea/coffee)

Travel directions are available at www.hamilton.ie

SYSTEMS BIOLOGY
Hamilton Institute