

Editorial

Unravelling the function and kinetics of biochemical networks

Bioinformatics has been evolving for the last 20 years. One of the major thrusts of the field is inferring the functions of proteins. There are many techniques for this: sequence similarities, common structural motifs, gene order, gene fusion events and similarities in gene expression. This gives a static picture of the protein function in a biochemical pathway. However, biological systems are, by their nature, dynamic. As a consequence, the focus is changing. Mathematical and computational methods are being applied to predict function based on the role of genes and proteins in networks. These methods are old; the increase of computing power and high-throughput biological data makes their application more viable now.

Our aim has always been to understand the biological system as a whole; the combination of techniques available nowadays brings us ever closer to this goal. In this volume, we have collected papers on molecular systems biology. Each paper describes a different problem and gives a novel approach to understanding the inherent biochemical mechanism. The overall approach has a strong theoretical component, and we have shown that this is effective in analysing biological systems. The next challenge is to engage more experimentalists in this work and together move the biomedical sciences forward.

This Special Issue arises from the Biocomplexity Workshop 7 held in Indiana University, Bloomington, in May 2005 as part of the Biocomplexity Institute workshop series. Biocomplexity 7 was titled "Unravelling the function and kinetics of biochemical networks: From Experiments to Systems Biology". The meeting discussed current and future problems in the reconstruction, kinetics and function of biochemical pathways. We brought together researchers in many disciplines including experimental and theoretical biochemistry, biophysics, mathematics, engineering and computer science. We are also fortunate to have contributions from experts who could not participate in the workshop.

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