Modelling acetogen metabolism

BBSRC Industrial CASE 4 year PhD studentship

There is currently interest in expanding the range of organisms used in industrial biotechnology and the range of products made with them. One option is to use one carbon precursors, such as syngas (CO, CO2 and H2) or waste gases from steel plants. These can be exploited by organisms such as the acetogens, which use the Woods-Ljungdahl pathway to convert 1C compounds to acetate and other low-value products. The organisms would need to be engineered to produce more complex, higher value products, but a limitation is that their metabolism has not been extensively studied.

Since a number of the acetogens have been sequenced, their metabolic networks can be investigated with the emerging technique of genome-scale metabolic modelling. This can determine the metabolic capabilities encoded in the genome, and be used as a tool to design modifications to produce novel products. The modelling process involves extracting the metabolic network from databases and analysing it by techniques including linear programming (also called flux balance analysis). The specific aim of this project is to construct a metabolic model of the representative acetogen *Acetobacterium woodii* to assess its potential for industrial biotechnology.

This systems biology project has a theoretical and experimental component. The theoretical component is the construction and analysis of the metabolic model within the Cell Systems Modelling Group (http://mudshark.brookes.ac.uk/) at Oxford Brookes University. The group has previously used its metabolic modelling package, ScrumPy, to build a number of bacterial and plant metabolic models. The experimental component will consist of two three month placements at BioSyntha for obtaining the fermentation data needed to formulate and test the model.

References

David A Fell, Mark G Poolman, and Albert Gevorgyan. Building and analysing genome-scale metabolic models. *Biochem Soc Trans*, 38(5):1197-1201, Oct 2010.

For a full list of previous related work, see http://mudshark.brookes.ac.uk/Publications.

Details

Supervisors: Prof David Fell and Dr Mark Poolman
Industrial partner: BioSyntha Technology Ltd (http://www.biosyntha.com/)
Start date: 2 January 2015

Application Information

Closing date: 28 November 2014

Please follow the instructions at http://mudshark.brookes.ac.uk/AcetoGen.

For further information on the project description please e-mail: Professor David Fell (dfell@brookes.ac.uk) or Dr Mark Poolman (mgpoolman@brookes.ac.uk).