



CBMNet

CROSSING BIOLOGICAL MEMBRANES NETWORK, A BBSRC NIBB



The
University
Of
Sheffield.

UNIVERSITY of York



Enhancing industrial succinate production in *Corynebacterium glutamicum*

The Challenge

Succinic acid, produced petrochemically, is an important feedstock which acts as a precursor for chemicals found in food, pharmaceuticals, green solvents and biodegradable plastics.

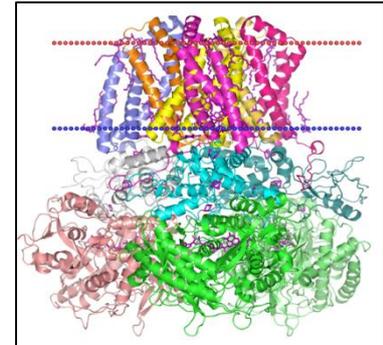
The U.S. Department of Energy has reported succinate in the 12 top chemical building blocks that can be manufactured from biomass at a market value of \$15 bn pa. Therefore, much effort has been spent recently to develop succinate-producing organisms.

Corynebacterium glutamicum bacteria grow rapidly and are already used for industrial production of amino acids. Under oxygen deprivation, it produces organic acids such as lactate, acetate and succinate. Considerable effort has therefore gone to engineer it for succinate production.

The Research

Dr Arnaud Javelle (AJ) is a Chancellor's Fellow at the Strathclyde Institute of Pharmacy and Biomedical Sciences. The research in his laboratory focused on the characterisation of membrane proteins involved in transport of ions across cellular membranes and in signalling processes relating to ion availability.

Dr Javelle applied for a CBMNet Vacation Scholarship, which provided funding for an undergraduate student. The project focused on the characterisation of a potential new class of succinate transporter in *C. glutamicum* in order to enhance succinate metabolism and increase production of industrially-useful metabolites, such as the C1-4 dicarboxylic acids.



CBMNet Vacation
Scholarship

The Result

Gordon Williamson (Dr Javelle undergraduate student), produced a collection of plasmids and *C. glutamicum* strains required to analyse the physiological role of a potential new class of transporter in *C. glutamicum* succinate metabolism.

The experience was highly beneficial for Gordon who developed a strong interest for molecular microbiology and biochemistry.

Gordon will join the AJ lab again to complete his 4th year BMS project.

The Future

An Erasmus student from Germany who joined the AJ lab for a year to complete her Diploma thesis continues the project initiated during this CBMNet scholarship.

Her task is to complete the phenotypic characterisation of the strains produce by Gordon. The results will be used to apply for further funding to the BBSRC as the project aligns perfectly with two high level strategic priority areas that the BBSRC has identified for the next 5-years.

Finally, this project aligns with Strathclyde hosting of the Industrial Biotechnology Innovation Centre and Ingenza, a worldwide leader in the application of industrial biotechnology and synthetic biology, have been contacted and show interest in the project. This collaboration with Ingenza will greatly improve chances of securing further funding.

This project was funded through the Crossing Biological Membranes Network (CBMNet) by the Biotechnology and Biological Sciences Research Council (BBSRC)

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"The CBMNet scholarship offered the possibility for my lab to start a completely new and exciting project. The future potential collaboration with an industrial partner and the prospect of further funding made this scholarship particularly valuable." - Dr Arnaud Javelle"

Dr Arnaud Javelle

"My summer scholarship was an incredible experience, allowing me to develop lab skills and apply the theory that I've studied. It also granted valuable insight into the PhD process, informing future decisions. I've since reunited with my supervisor for my Honours project."

Gordon Williamson