IDENTIFICATION OF A SUCROSE METABOLISING *ESCHERICHIA COLI*

By

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THE CHEMICAL INDUSTRY is a US$2 trillion global enterprise. Presently, raw materials for the chemical industry are mainly derived from non-renewable resources. However, renewable resources are increasingly sought and sugarcane is the current commercial crop that best meets the requirements of a renewable feedstock.

In order to produce chemicals from sugar in a cost effective manner, we typically need to genetically engineer a microbe to enhance yield and productivity. The preferred organism for this so-called metabolic engineering approach is *Escherichia coli*.

E. coli is currently used commercially in the production of amino acids, monomers for plastic (e.g. 1, 3-propanediol) and polymers. Unfortunately, the conventional strains used in metabolic engineering (K12 and B) do not metabolise sucrose.

We have identified and characterised a strain of *E. coli* that is very efficient at utilising sucrose. The strain grows faster on sucrose based minimal medium than standard K12 does on glucose based medium. In batch bioreactor fermentation, the *E. coli* strain used sucrose as a sole carbon source in a minimal medium at a high rate both under aerobic (7 mmol/litre-hour) and anaerobic conditions (3 mmol/litre-hour). In order to establish a metabolic engineering platform, we have sequenced the strain and compared it to previously sequenced *E. coli*. In addition, a derivative strain harbouring a plasmid containing a high affinity L-lactate dehydrogenase gene for lactic acid production from *Lactobacillus casei* has been constructed to demonstrate the cell potential in producing high value products from sucrose.