Novel NZ natural pigments from microbial sources

The Centre for Microbial Innovation (CMI) creates food colouring from a fermentative source

The Centre for Microbial Innovation (CMI) is a unique cross disciplinary environment for theoretical and practical research and problem solving. The CMI brings together University of Auckland researchers with a range of expertise centred on the ecology and function of microbial systems and a broad group of associates from The University of Auckland whose research involves the practical application of microbial systems and processes.

Within the CMI, Dr Silas Villas-Boas' group carries out research on microbial physiology with a focus on metabolic mechanisms in living cells. Through a multi-disciplinary approach involving aspects of microbiology, biochemistry, chemistry and engineering, the CMI team aims to develop new cutting edge technologies to gain an insight into the mechanisms governing complex metabolic pathways relevant in industrial fermentation processes, human disease development and in food processes. One area Dr Silas Villas-Boas’ group has focused on due to consumer demand is the move for food manufacturers worldwide to produce more natural colours, in an effort to replace potentially harmful artificial colourings now used in many foods and beverages. Food colouring now represents a $1.2 billion global market, with natural colours capturing 31% of the food market, but growing at a rate of 5%. However, these natural colours are largely plant extracts that have the disadvantage of variability and seasonal supply. Fungal cell production offers reliable scalable technology.

The Centre for Microbial Innovation uses specialised research expertise to unravel the secrets of microbes and investigate how their behaviours can be exploited across fields as diverse as food, health, energy and the environment. The CMI is harnessing the vast capabilities of microorganisms to underpin sustainable management and development of New Zealand’s natural and economic resources.
The aim of Dr Silas Villas-Boas’ research project has been to screen pigment-producing microbes from the New Zealand environment. The microbes selected are primarily isolated from stream water and as such they present considerable potential for production of food-grade pigments. The selection has been based on the current market demands for specific colour shades and pigment properties. To date, the research group has screened 288 pigment-producing microbial strains isolated from the New Zealand environment. Within the 288 strains, they have isolated 122 methanol- and/or water-soluble pigment extracts to be purified by liquid chromatography (HPLC). A total of 44 microbial strains were shortlisted based on the water solubility and colour-shades of their pigments. Molecular identification of the selected strains using ribosomal DNA sequencing showed the presence of 12 undetermined genera and 30 known genera including 37 bacteria, 4 fungi and 1 microalga. Colour shades ranged from yellow and dark orange to pink, red and blue. In terms of temperature stability tests, results showed that 28 out of 44 selected pigments were stable at all ranges of temperature (i.e. -20°C, 4°C, 60°C, 100°C and microwave irradiation for 5 min). In addition, 39 out of 44 pigments showed good stability to light and pH. Therefore microbial-derived pigments have presented great potential to be used as food-grade pigments.

This is one example of the expertise of the researchers involved in the CMI, and their access to leading edge technical facilities in genomics and proteomics, metabolomics, transcriptomics, bioinformatics and microfabrication.

The University of Auckland

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It is also the highest ranked New Zealand university in the QS World University Rankings and the Shanghai Jiao Tong Academic Ranking of World Universities.

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