How to get fossil fuels from ice cream and soap

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Scientists at the University of Manchester have identified a biocatalyst which could produce chemicals found in ice-cream and household items such as soap and shampoo – possibly leading to the long-term replacement of chemicals derived from fossil fuels.

Writing in *PNAS*, the researchers have shown that the emerging field of synthetic biology can be used to manipulate hydrocarbon chemicals, found in soaps and shampoos, in cells.

This development, discovered with colleagues at the University of Turku in Finland, could mean fuel for cars or household power supplies could be created from naturally-occurring fatty acids.

The researchers, led by Professor Nick Turner from The University of Manchester, used synthetic biology to hijack the naturally-existing fatty acids and direct those fatty molecules towards the production of ready-to-use fuel and household chemicals.

Hydrocarbon chemicals are everywhere in our daily lives; as fragrance in soap, thickener in shampoo and fuel in the car. Their number of carbons and whether they are acid, aldehyde, alcohol or alkane are important parameters that influence how toxic they are to biological organisms, the potential for fuel and their olfactory perception as aroma compounds.

The breakthrough allows researchers to further explore how to create renewable energy from sustainable sources, and the advance could lead

to more innovative ways of sourcing fuel from natural resources.

Synthetic biology is an area of biological research and technology that combines science and engineering for the benefit of society. Significant advances have been made in this field in recent years.

Professor Turner said: "In our laboratories in Manchester we currently work with many different biocatalysts that catalyse a range of chemical reactions – the key is to match up the correct biocatalyst with the specific product you are trying to make.

"Biocatalysts recognise molecules in the way that a lock recognises a key – they have to fit perfectly together to work. Sometime we redesign the lock so that if can accept a slightly different key allowing us to make even more interesting products.

"In this example we need to make sure that the fatty acid starting materials would be a perfect match for the biocatalysts that we discovered and developed in our laboratories.

"As with many leading areas of science today, in order to make major breakthroughs it is necessary for two or more laboratories around the world to come together to solve challenging problems."

More information: Carboxylic acid reductase is a versatile enzyme for the conversion of fatty acids into fuels and chemical commodities, by M. Kalim Akhtar, Nicholas J. Turner, and Patrik R. Jones, *PNAS*, 2012.

Provided by University of Manchester