Scientific breakthrough reveals how vitamin B12 is made

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(Phys.org) —A scientific breakthrough by researchers at the University of Kent has revealed how vitamin B12/antipernicious anaemia factor is made – a challenge often referred to as 'the Mount Everest of biosynthetic problems'.

Vitamin B12 is pieced together as an elaborate molecular jigsaw involving around 30 individual components. It is unique amongst the vitamins in that it is only made by certain bacteria. In the early 1990's it was realised that there were two pathways to allow its construction – one that requires oxygen and one that occurs in the absence of oxygen. It is this so-called anaerobic pathway, which is the more common pathway, that proved so elusive as the components of the pathway are very unstable and rapidly degrade.

However, as explained in a paper published by *PNAS* (*Proceedings of the National Academy of Sciences*), bioscientists at the University of Kent have trained a friendly bacterium called Bacillus megaterium to produce all of the components of the anaerobic B12 pathway. This has helped them acquire the missing molecular pieces of the jigsaw, allowing them to complete the picture of how this remarkable molecule is made.

The team hopes that this newly acquired information can be used to help persuade bacteria to make the vitamin in larger quantities, thereby contributing to its use in medication for people suffering with the blood disorder pernicious anaemia, amongst other things.

Professor Martin Warren, who led the research, said: 'This is a really exciting time in the biological sciences – one where our knowledge can be applied with the emerging discipline of synthetic biology to produce strains of bacteria that make enough B12, and other vitamins, for use in medicine and other sectors, such as feed for livestock.'

Key academic partners in the research included Dr Rebekka Biedendieck (Braunschweig University of Technology) and Dr Steve Rigby (Manchester Institute of Biotechnology). The Kent team also included Dr Simon Moore and Dr Mark Howard, Reader in Biological NMR Spectroscopy.

The research was funded by a grant from the Biotechnology and Biological Sciences Research Council (BBSRC) to Professor Warren and Dr Howard.

More information: 'Elucidation of the anaerobic pathway for the corrin component of cobalamin (vitamin B12)' can be viewed online at www.pnas.org/content/early/2013/08/06/1308098110

Provided by University of Kent