Marine microbes creating green waves in industry

August 7 2009

New technology designed to analyse large numbers of novel marine microbes could lead to more efficient and greener ways to manufacture new drugs for conditions such as epilepsy, diabetes, flu and other viruses, as well as improving the manufacture of other products such as agrochemicals.

Researchers at Heriot-Watt University and Plymouth Marine Laboratory (PML) in collaboration with Edinburgh based company Ingenza Ltd are searching for new enzymes for use as manufacturing tools in the pharmaceutical and agrochemical industries. The research project, funded by the Biotechnology and Biological Sciences Research Council (BBSRC) and the Technology Strategy Board (TSB), uses biochemical techniques to identify potentially useful enzymes in microbes that are found in the sea.

This work brings important expertise from industry together with academic researchers. The value in this approach is to take specific knowledge and expertise in biochemistry and molecular biology, coupled with novel and diverse marine microbes, right through to high-yielding, scalable and economic manufacturing processes. These processes use enzyme catalysts from the marine microbes, which lead to greener and cleaner manufacturing methods.

Dr Robert Speight, from Ingenza Ltd, explained: "We are using biology in our chemical processes to come up with improved manufacturing routes. We are taking advantage of the natural diversity of marine

organisms that has arisen through evolution in different environments and coupling that with high-tech screening systems. We are looking to find naturally occurring microbes that already have a built-in capacity to do the chemical reactions we want to perform in industry. There is every possibility of developing more efficient and sustainable manufacturing solutions - for pharmaceuticals and agrochemicals in particular - as a result of this search."

Microorganisms account for more than 95 per cent of ocean biomass but relatively little is really known about them and their potential applications. The research team's search is for industrially relevant enzymes which will reduce waste and increase productivity in the manufacture of drugs and agrochemicals. The enzymes they seek have the ability to convert compounds that would have previously been waste products in the manufacturing process, into the desired product, therefore increasing the efficiency of the process.

Professor Mark Keane, from Heriot-Watt University, said: "Our approach is to look for microbes which can promote the chemical reactions that we want to use in manufacturing. We then treat the microbes under conditions where they produce the key enzymes in higher yield, which we finally purify. The enzymes then undergo systematic testing to evaluate their activity, which enables us to pinpoint candidates that exhibit the best performance."

We are now identifying microbes with a type of enzyme called an amine oxidase. This could be key to cheaper, more efficient and sustainable process in the synthesis of valuable chemicals by both the pharmaceutical and agrochemical industries."

Commenting on the findings, BBSRC Chief Executive Professor Doug Kell, said: "Green and White biotechnologies are going to be an increasingly important part of the manufacturing landscape. Looking to

biological systems that have been finely tuned by evolution to solve problems, rather than starting from scratch every time, might seem an obvious thing to do. It does however, in many cases, require the bringing together of particular niche expertise. The value of this collaboration is in the coincidence of knowledge and expertise from academia with the uniquely important business of synthesising a product on a large scale.

"What the outcomes of this project will offer us is the chance to have a significant impact on the sustainability of pharmaceutical and biochemicals production as we move from oil-based to photosynthesis-derived chemistry."

Source: Biotechnology and Biological Sciences Research Council (news : web)