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LOGAN, Utah – April 12, 2015 – A researcher at Utah State University is developing a cutting-edge method for synthesizing some of the most promising natural compounds found in plants using bacteria.

Jixun Zhan, Ph.D., associate professor of biological engineering, recently published new research in the Journal of Metabolic Engineering showing how various bioactive compounds can be biosynthesized using Escherichia coli. The journal is one of the most highly regarded in the biological engineering community.

The findings are a breakthrough in the growing field of combinatorial biosynthesis, and demonstrate that valuable, health-promoting compounds can be produced without the time-consuming methods of conventional plant cultivation.

Zhan and his team analyzed several metabolic pathways in plants to understand how they create a range of natural products and then constructed artificial biosynthetic pathways in a bacterial host to create multiple compounds including resveratrol and curcumin – two compounds that show several promising health-promoting properties.

In this work, we demonstrated that biosyntheic enzymes from different sources can be recombined like Legos to make various molecues," writes Zhan in his latest publication, "Metabolic engineering of Escherichia coli for the biosynthesis of various phenylpropanoid derivatives."

Resveratrol – a type of natural phenol found in the skin of grapes, blueberries, raspberries and peanuts – has antioxidant, anti-inflammatory and anticancer properties and is used as a nutritional supplement. Curcumin – the major active component in turmeric – has been shown to be effective at treating allergies, asthma, cancer and Alzheimer’s disease.

Zhan's team constructed a library of eight enzymes for combinatorial biosynthesis and created 12 bioactive molecules using E. coli.

With different combination of these biosynthetic tools, he explained, a variety of pathways can be established to yield desired products including some novel compounds – many of which can play a role in the development of new drugs and existing pharmaceutically important compounds.

Zhan is the principal investigator into the research. His co-authors are Siyuan Wang, Shuwei Zhang, Anfeg Xiao, Micah Rasmussen and Chad Skidmore.

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