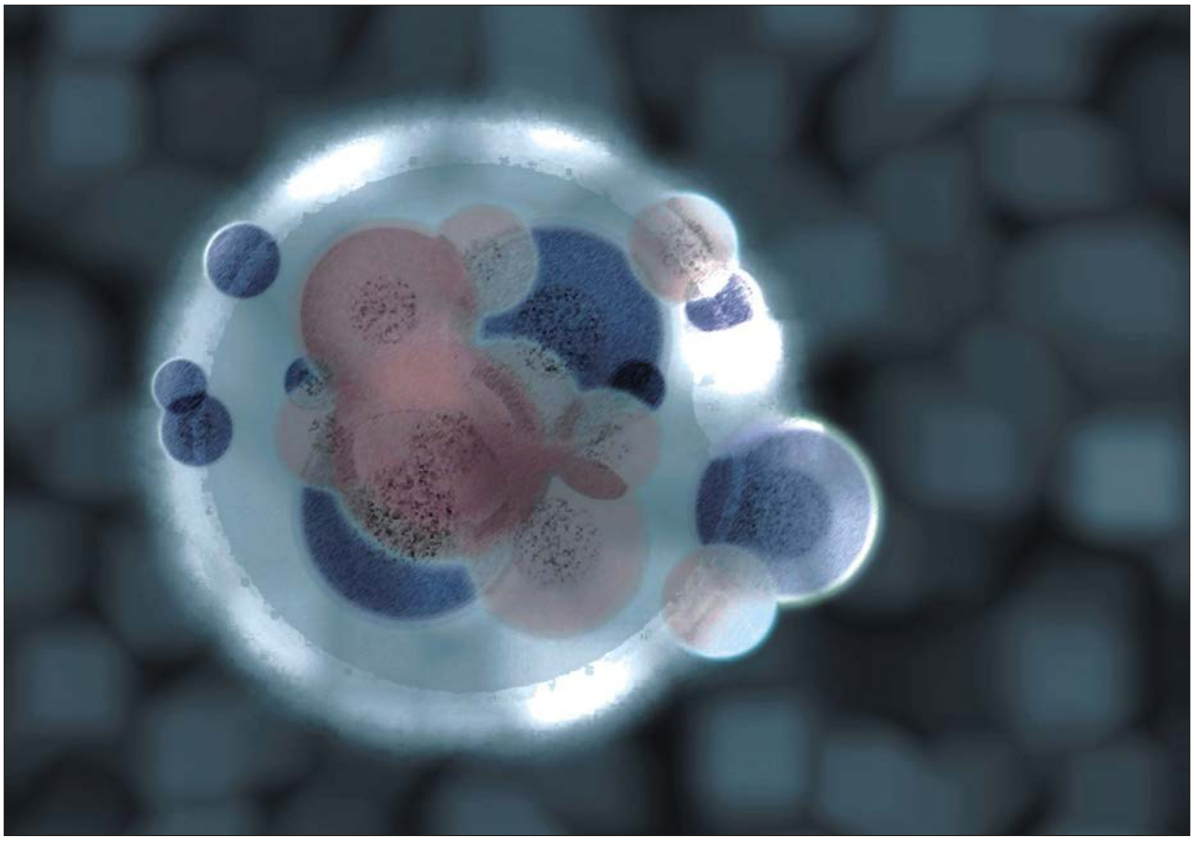

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Gene Find Could Lead to Healthier Food, Better Biofuel Production

Purdue University scientists have found the last undiscovered gene responsible for the production of the amino acid phenylalanine, a discovery that could lead to processes to control the amino acid to boost plants' nutritional values and produce better biofuel feedstocks.

Natalia Dudareva, a distinguished professor of horticulture, and Hiroshi Maeda, a postdoctoral researcher in Dudareva's laboratory, determined that the gene is one of 10 responsible for phenylalanine production in plants. Understanding, how the amino acid is produced could provide a strategy to increase or reduce that production.

Phenylalanine is important for plant protein synthesis and for the production of flower scent, anti-oxidants and lignin, a principal plant cell wall component that helps plants stand upright and acts as a barrier in the production of cellulosic ethanol. It is one of the few essential amino acids that humans and animals cannot synthesize, so it must come from plants.

"In plant tissues, where we want to lower lignin content, we may be able to block these pathways," Maeda said. "In cases, where you want to increase the amount of phenylalanine, we could do that as well."

Decreasing phenylalanine could lead to a reduction in lignin, which would improve digestibility of cellulosic materials for ethanol production. Increasing phenylalanine could boost the nutritional value of some foods.

Dudareva and Maeda used a co-expression analysis to find the prephenate aminotransferase gene. They monitored the expression activity of nine genes in the research plant Arabidopsis that were known to be involved in phenylalanine production and looked for other genes that became active at the same time.

"This gene had almost identical gene expression patterns as the known *phenylalanine*-related genes," Maeda said.

The comparable gene in petunias also was identified. Dudareva and Maeda confirmed that its expression patterns matched other genes involved in the formation of *phenylalanine* and volatile scent compounds in the flower.

To test the find, Dudareva and Maeda used the *E. coli* bacteria. They overexpressed the protein encoded by newly discovered gene and detected the expected enzyme activity. They also decreased the gene's expression in petunia flowers and witnessed a reduction in *phenylalanine* production.

"We provided both biochemical and genetic evidence that the gene is indeed involved in *phenylalanine* biosynthesis," Dudareva said. "It completes the pathway."

Dudareva said she would use the discovery to increase the scent of flowers in order to study the interaction of insects with flowers.

Dudareva and Maeda's findings were published in the early online version of the journal Nature Chemical Biology. The National Science Foundation funded the research.