Engineered microbes grow in the dark

May 20 2013

Scientists at the University of California, Davis have engineered a strain of photosynthetic cyanobacteria to grow without the need for light. They report their findings today at the 113th General Meeting of the American Society for Microbiology.

"In this work, we used synthetic biology approaches to probe and rewire photoautotrophic (exclusively relying on carbon dioxide and light energy for growth) cyanobacterial metabolism for the ability to grow without light energy," says Jordan McEwen, the lead researcher on the study. He is part of Shota Atsumi's lab at the university, a research group focused on developing synthetic organisms capable of converting carbon dioxide directly to biofuels.

The cyanobacterium strain Synechococcus elongatus strain PCC 7942 has been well characterized as a model photoautotroph. Previous work by Atsumi's lab has engineered this organism to recycle carbon dioxide into a variety of biofuels and valuable chemicals in the presence of light. Any cost-effective, cyanobacterial biofuel production scheme would use natural lighting conditions, limiting how much biofuel could be produced in a 24-hour period.

"To overcome this constraint, we installed foreign genes into S. elongatus to allow this cyanobacterium to grow and generate biofuels in diurnal (light or dark) conditions," says McEwen. "With recent, increased focus on cyanobacteria-based industrial applications, this advancement is desirable for more efficient, economical and controllable bioproduction systems."

Provided by American Society for Microbiology