

Researcher identifies protein that concentrates carbon dioxide in algae

April 8 2009

(PhysOrg.com) -- Increasing levels of carbon dioxide in the atmosphere are a concern to many environmentalists who research global warming.

The lack of atmospheric carbon dioxide (CO₂) concentration, however, actually limits the growth of [plants](#) and their aquatic relatives, microalgae.

For plants and microalgae, CO₂ is vital to growth. It fuels their photosynthesis process that, along with sunlight, manufactures sugars required for growth.

CO₂ is present in such a limiting concentration that microalgae and some plants have evolved mechanisms to capture and concentrate CO₂ in their cells to improve photosynthetic efficiency and increase growth.

An Iowa State University researcher has now identified one of the key proteins in the microalgae responsible for concentrating and moving that CO₂ into cells.

"This is a real breakthrough," said Martin Spalding, professor and chair of the department of genetics, development and [cell biology](#). "No one had previously identified any of the proteins that are involved in transporting CO₂ in microalgae."

The main protein that Spalding and his team have identified that is responsible for transporting CO₂ is called HLA3.

The research by Spalding; Deqiang Duanmu, a graduate student in Spalding's department; and Amy Miller, Kempton Horken and Donald Weeks, all from the University of Nebraska, Lincoln; is published in the current issue of the journal [Proceedings of the National Academy of Sciences](#) of the United States of America.

Now that the HLA3 protein has been identified, Spalding believes there are several possibilities to use the gene that encodes this protein.

The recent explosion of interest in using microalgae for production of biofuels raises the possibility of increasing photosynthesis and productivity in microalgae by increasing expression of HLA3 or other components of the CO₂ concentrating mechanism, according to Spalding.

Since all plants need CO₂ to thrive, introducing the HLA3 gene into plants that do not have the ability to concentrate CO₂, could help those plants grow more rapidly.

Spalding says several plants would be candidates for the HLA3 protein.

"One of the things we've been working on is the prospect that we may be able to take components of the CO₂ concentrating mechanism for microalgae, such as this HLA3, and put it into something like rice and improve photosynthesis for rice," said Spalding.

Rice and other commodity crops such as wheat and soybeans do not have any CO₂ concentrating mechanism.

Provided by Iowa State University of Science and Technology

Citation: Researcher identifies protein that concentrates carbon dioxide in algae (2009, April 8)
retrieved 23 April 2024 from <https://phys.org/news/2009-04-protein-carbon-dioxide-algae.html>

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