Marine bacteria can create environmentally friendly energy source

January 10 2007

Bacteria in the world's oceans can efficiently exploit solar energy to grow, thanks to a unique light-capturing pigment. This discovery was made by researchers at University of Kalmar in Sweden, in collaboration with researchers in Gothenburg, Sweden, and Spain. The findings are described in journal *Nature*.

"It was long thought that algae were the only organisms in the seas that could use sunlight to grow," says Jarone Pinhassi, a researcher in Marine Microbiology at Kalmar University College. These microscopic algae carry out the same process as green plants on land, namely, photosynthesis with the help of chlorophyll.

In 2000 scientists in the U.S. found for the first time that many marine bacteria have a gene in their DNA that codes for a new type of light-capturing pigment: proteorhodopsin.

Proteorhodopsin is related to the pigment in the retina that enables humans to see colors. It should be possible for this pigment to enable marine bacteria to capture solar light to generate energy, but until now it had not been possible to confirm this hypothesis.

Last year researchers from Kalmar collected 20 marine bacteria from different ocean areas and mapped their genomes. Several of them proved to contain the pigment proteorhodopsin. This made it possible to run a series of experiments that clearly show that growth in bacteria with this pigment is stimulated by sunlight, because the pigment converts

solar energy to energy for growth. In other words, the scientists had found a new type of bacterial photosynthesis that takes place in the seas.

It's easier to understand the importance of understanding new mechanisms in marine bacteria to making efficient use of solar energy if we consider the fact that one liter of natural sea water contains roughly a billion bacteria. The activity of these bacteria is of great importance to the carbon cycle, through, for example, the amount of carbon dioxide they produce, and also to how the solar energy that reaches the earth is channeled through the nutrition cycle.

"Bacteria in the surface water of the world's oceans swim in a sea of light," says Jarone Pinhassi. "And it is shouldn't be too surprising that evolution has favored microorganisms that can use this rich source of energy. This type of protein may also play a role in commercial and environmental perspectives, for the development of artificial photosynthesis for the environmentally friendly production of energy."

Source: Swedish Research Council