Re: Article: Bacterial Evolution Down in the Depths

Source: http://sci.tech−archive.net/Archive/sci.bio.evolution/2005−08/msg00027.html

- *From*: "Perplexed in Peoria" <jimmenegay@xxxxxxxxxxxxx>

- *Date*: Tue, 2 Aug 2005 03:00:03 −0400 (EDT)

"Robert Karl Stonjek" <rstonjek@xxxxxxxxxxxxxx> wrote in message
news:dcmakm$2bh4$1@xxxxxxxxxxxxxxxxxxxxxx
> Down in the depths
> Sheilagh Molloy
>
> An obligate photosynthetic anaerobe found in deep−sea hydrothermal vents
> might photosynthesize by harnessing geothermal light rather than solar
> energy, according to recently published results.
>
> Scientists have been exploring the microbiology of deep−sea hydrothermal
> vents − geysers that form along volcanic mid−ocean ridges − using
> submersible vessels for almost 30 years. Until now, life in this environment
> was thought to depend on chemotrophic bacteria, although the identification
> of low−level illumination in the form of 'vent glow' gave a tantalizing hint
> that photosynthesis was a possibility.
>
> Beatty et al. investigated whether geothermal illumination could support
> photosynthesis by analysing samples taken from the effluent plume of a type
> of vent known as a black smoker located at the East Pacific rise. Enrichment
> culturing yielded a non−motile bacterium that has been named GSB1. Analysis
> of the absorption and emission spectra of intact GSB1 cells isolated in pure
> culture − with major peaks at 750 nm and 775 nm, respectively − indicated
> the presence of light−harvesting bacteriochlorophyll c.
>
> Further analysis by electron microscopy revealed the presence of
> light−harvesting chlorosomes, structures that are commonly found in green
> sulphur bacteria. Light energy is transferred to the chlorosome reaction
> centre through the Fenna?Matthews?Olson (FMO) protein; PCR using
> FMO−specific primers amplified a 970−bp FMO segment from GSB1, and sequence
> analysis led the authors to conclude that GSB1 is a green sulphur bacterium
> related to the Chlorobium and Prosthecochloris genera. For growth, GSB1
> requires anaerobic growth conditions, sulphur in the form of elemental
> sulphur or H2S, CO2 and light.
>
> This identification of a green sulphur bacterium in a sample taken from a
> deep−sea hydrothermal vent not only suggests that photosynthesis can take
> place in the absence of sunlight but also once again illustrates the maxim
> that bacteria are the ultimate survivors.

>
> Full Text at Nature
> http://www.nature.com/nrmicro/journal/v3/n8/full/nrmicro1220_fs.html

It seems we still don't have a proof that these bacteria are actually receiving and utilizing light. All we know is that they have some of the machinery for doing so.

A speculation: Isn't it possible that the chlorosomes are simply acting as intermediate carriers in a non−photo−assisted electron transport chain? ISTM that the environment in which these bacteria are found should be rich enough in CO, CO2, and H2S to support reductive carbon fixation even without a photo−assist. Building the chlorosomes when some simpler electron carrier would do does seem wasteful, but then mother nature only economizes when she is forced to.

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