Genetic adaptations are key to microbe's survival in challenging environment

February 6 2009

The research focused on the bacterium *Nautilia profundicola*, a microbe that survives near deep-sea hydrothermal vents. Photosynthesis cannot occur in this dark environment, where hot, toxic fluids oozing from below the seafloor combine with cold seawater at very high pressures.

The study, involving scientists at the University of Delaware, the Davis and Riverside campuses of the University of California, the Universities of Louisville, KY, and Waikato, New Zealand, and the J. Craig Venter Institute, combined genome analysis with physiological and ecological observations to investigate the importance of one gene in *N. profundicola*. Previous studies found the gene only in microorganisms growing in temperatures greater than 80oC, but *N. profundicola* thrives best at much lower temperatures. The gene's presence in *N. profundicola* suggests that it might play a role in the bacterium's ability to survive rapid and frequent temperature fluctuations in its environment.

The researchers also uncovered further adaptations to the vent environment, including genes necessary for growth and sensing environmental conditions, and a new route for nitrate assimilation related to how other bacteria use ammonia as an energy source.

These results help to explain how microbes survive near deep-sea hydrothermal vents, where conditions are thought to resemble those found on early Earth, as described in the study. Improved understanding of microbes living in these conditions may aid our understanding of how life evolved here.

Paper: Campbell BJ, Smith JL, Hanson TE, Klotz MG, Stein LY, et al. (2009) Adaptations to Submarine Hydrothermal Environments Exemplified by the Genome of Nautilia profundicola. *PLoS Genet* 5(2): e1000362. doi:10.1371/journal.pgen.1000362
www.plosgenetics.org/article/i … journal.pgen.1000362

Source: Public Library of Science