

Bigelow laboratory scientists doach to study marine microbes

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In a paper published this month in the *Proceedings of the National Academy of Sciences*, Dr. Ramunas Stepanauskas and Dr. Michael Sieracki have proven a new method of identifying genetic codes of ocean microbes from a single cell.

Drs. Michael Sieracki and Ramunas Stepanauskas, scientists at Bigelow Laboratory, have proven a new approach of obtaining genetic codes of ocean microbes, based on the analysis of individual unicellular organisms.

"The microbes in the oceans control most major chemical cycles in the biosphere, yet we know very little about how they work or who they are. Finding a reliable and economical way of accessing genomes of the uncultured microorganisms is one of the biggest challenges facing environmental microbiologists today", said Dr. Sieracki. Over 99% of the Earth's microorganisms cannot be cultivated in laboratory, making their ecological roles, biochemistry and potential practical applications an unresolved mystery.

The cutting-edge approach to tackle this enigma, originally developed for the human genome sequencing project, has been sequencing large quantities of short sections of DNA from the extracts of entire microbial communities, and then assembling these sections back into individual genomes by computational means.

Unfortunately, the diversity of natural microbial communities proved so

incredibly high, that very few genomes could be assembled from even the largest metagenomic studies, consisting of millions of DNA sequences. In a paper published this month in the Proceedings of the National Academy of Sciences, Drs. Stepanauskas and Sieracki propose an alternative to the metagenomic research.

"We present a novel approach to studying metabolic capabilities of the uncultured microbial taxa. Our method is based on fluorescence-activated sorting, whole genome amplification, and multi-locus DNA sequencing of single cells. This allows us to sequence any number of genes in each cell, including those that reveal cell's identity and those that tell us what biochemical reactions the cell is capable of performing", said Dr. Stepanauskas.

The publication "Matching phylogeny and metabolism in the uncultured marine bacteria, one cell at a time," is a result of the researchers' collaboration, which has developed since Dr. Stepanauskas arrived at Bigelow in 2005. "The availability of the first flow cytometry facility dedicated to ocean science, which is headed by Dr. Sieracki, was one of the reasons behind my move to Bigelow", said Dr. Stepanauskas.

Source: Bigelow Laboratory for Ocean Sciences

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