Viva Origino 33 (2005) 41－172

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THERMOPHILES AND EARLY EVOLUTION OF LIFE.

Akihiko Yamagishi, Department of Molecular Biology, Tokyo University of Pharmacy and Life Science, 1432-1 Horinouchi, Hachioji-shi, Tokyo 192-0392 Japan.
yamagish@ls.toyaku.ac.jp

Analysis of thermophiles and thermophilic environment is expected to prove information on the early history of evolution of life. In this presentation, I am going to report on two topics. First, culture-independent analysis of microbial community around deep-sea hydrothermal system will be presented. The presence of microbial community depending on chemoautotrophic organisms under the seafloor was suggested. Second, new technique of analyzing ancient organisms will be presented. The technique depends on ancestral residues inferred by phylogenetic analysis of homologous genes of many organisms (1,2). If the sequences of homologous genes are aligned then it is possible to infer ancestral amino acid residue at each position of the sequence. The ancestral amino acid residues are expected to be present at the corresponding positions of the sequence of the common ancestor. Then the ancestral amino acid residues are introduced to the homologous gene of a contemporary organism, as mutations. The product of the mutant gene is analyzed. The ancestral mutations are expected to induce the characteristics that are possessed by the gene product of the common ancestor. The mutant proteins having ancestral residues showed the tendency having higher thermal stability than the original wild type protein.

Reference:

1. Miyazaki, J. et al. J. Biochem. 129, 777-782 (2001)
2. Iwabata, H. et al. FEMS Microbilo. Lett. 243: 393-398 (2005)