

Laboratory of Molecular Biotechnology

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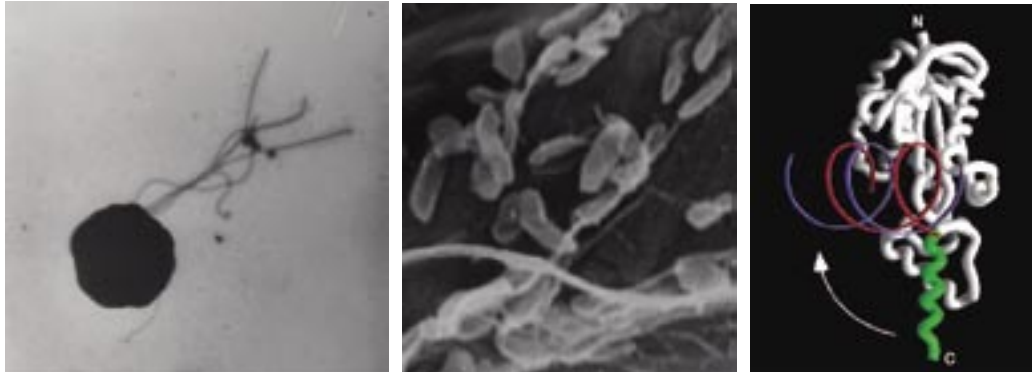
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Adaptation Mechanism of Enzymes from Extremophiles

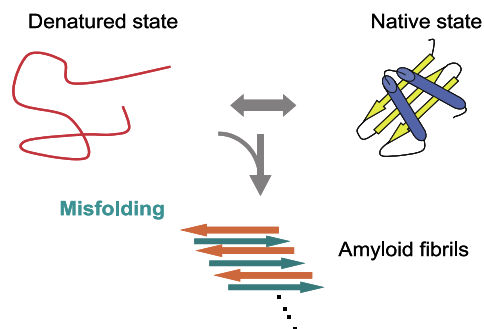
Enzymes catalyze a variety of biochemical reactions that [collectively] comprise life. They are highly specific and active even under mild conditions. Industrial processes using enzymes as biocatalysts are therefore expected to be environmentally more friendly and self-sustaining than petrochemical processes. Microorganisms are classified into psychrophiles, mesophiles, thermophiles, and hyperthermophiles based on their growth temperature. In these organisms, a variety of systems must be developed to permit their growth at different temperatures. Enzymes adapted to different temperature environments represent one of these systems. For example, the enzymes from psychrophiles and thermophiles are usually adapted to cold and hot environments. Elucidation of these adaptation mechanisms will not only facilitate understanding of the mechanisms of protein folding, but also contribute to the development of a method to improve protein function and to create proteins with novel functions. The purpose of this study is to isolate industrially useful proteins from extremophiles and to understand their adaptation mechanisms.



Hyperthermophilic archaeon KOD1 Psychrotrophic bacterium SIB1 Crystal structure of KOD1 RNase HI I

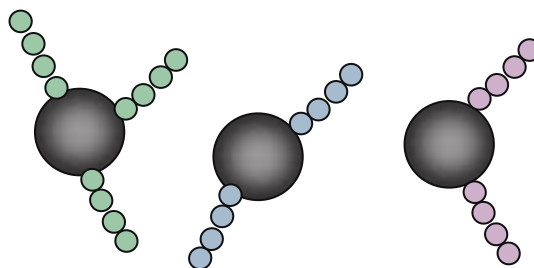
Principles of Protein Architecture

The elucidation of the principles of protein architecture requires understanding the relationship between the three-dimensional structures of proteins and their amino acid sequences. We focus on the stability, folding (misfolding and amyloid), and structures of proteins.



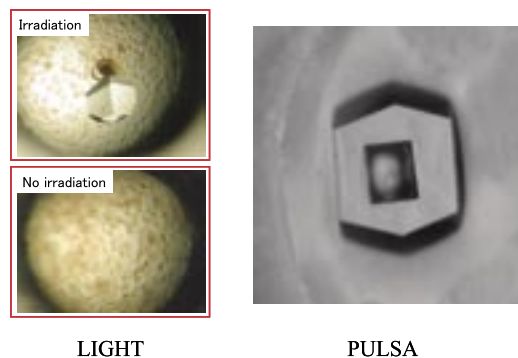
Combinatorial Protein Engineering

Combinatorial protein engineering investigates the sequence-structure-function relationships of proteins by screening functional proteins (or peptides) from huge molecular libraries, which contain a variety of genetic information. Our purpose is to develop novel screening techniques using nanoparticles.



Biocrystal Design

To advance structural genome science and to make next-generation devices possible, we have developed new techniques to grow and process protein crystals. These include the laser irradiated growth (LIGHT) technique, a solution stirring technique for crystal growth, and the pulsed UV laser soft ablation (PULSA) technique for processing.



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For other papers, see: <http://www.bio.mls.eng.osaka-u.ac.jp/>