

Microsymposium

MS80.O01

Crystallographic Studies of Proteins Under High Pressure Conditions

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High pressures encountered in the biosphere (i.e., at the bottom of the oceans) have extraordinary effects on biological molecules and assemblies. These include pressure denaturation of proteins, as well as dramatic changes in protein monomer-multimer association, substrate binding, membrane ion transport, transcription/translation of DNA & RNA, virus infectivity, enzyme kinetics, and conformational states of proteins. Yet practically all the biomolecules involved are highly incompressible. The challenge is to understand how pressure affects structure and to elucidate the relevant physical mechanisms for the observed effects even though the volume changes are very small. X-ray crystallography of proteins under high pressure conditions will be described. It is seen that the key point is not the magnitude of the structural changes, but rather the way differential compressibility of different parts of the protein affect functionality.

Keywords: High pressure crystallography, Protein structure, High Pressure Methods