

PSYCHROPHILIC MICROORGANISMS AND THEIR BIOTECHNOLOGICAL POTENTIAL

Summary

Research concerning extremophilic microorganisms have appreciably extended our knowledge about the life limits. Psychrophiles, which are cold-adapted microorganisms (some thrive even at -20°C) rank the first in abundance to the other groups of extremophiles. They populate the harshest environments on Earth, like permafrost, marine and glaciers ice, the highest parts of mountains, clouds and stratosphere. Psychrophiles have developed numerous molecular adaptations, without which they would not be able to persist in cold biotops. They produce protective exopolymers and low molecular weight cryoprotectants, polyunsaturated and branched fatty acids, which provide the appropriate fluidity of cell

membranes – essential for the communication with the environment, and different sorts of proteins, like ice nucleating proteins, cold shock and cold acclimation proteins and enzymes, characterized by molecular and kinetic adaptations to catalysis of metabolic reactions at low temperatures. All these biomolecules are extremely interesting for biotechnologists because they can either widen the assortment of products applicable to industry and medicine or be valuable molecular tools to be used in biotechnology for the manufacture of these products. The properties of psychrophilic microorganisms imply that development of life is possible also in some extraterrestrial environments.