

Extremophiles and Their Biomolecules

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ABSTRACT

Extremophiles are torch-bearers running ahead of us capable of paving our way through the unforeseen extremities. They (extremophiles from polar regions, thermal springs, deserts, hypersaline water bodies, deep sea floor, etc) have not only evolved rich reservoirs of biomolecules that can work under harsh industrial and climate conditions when applied for various purposes, but they do exhibit a series of adaptations that may serve as guiding principles to tailor the life forms for thriving under conditions of climate change. A large number of culturable extremophiles have been explored, but still, a large proportion of these have evaded culture approaches for which Metagenomic approaches have been applied. Many novel enzymes of industrial potential have been isolated metagenomically. Some of these biomolecules have been found to be pharmacologically very important with potential applications in removing many human maladies. Extremozymes from these extreme life forms are preferred in industries and research sectors. Food processing, biofuel production, production of pharmaceutical compounds, and bioremediation are some notable areas where extremozymes have started their presence felt. Recently, extremophiles have been explored as contributors to sustainable agriculture under harsh conditions. Extremophilic soil and plant-associated microbes have the potential to play a key role in engineering climate-resilient plants and agriculture. Extremophiles have also proved a suitable model system for studying the origin of life and adaptation to extreme conditions or life under extraterrestrial conditions such as on Mars.

Keywords: Extremophiles, Isolation of extremophiles, Extremozymes, Extremolites, Extremophiles and bioremediation, Extremophiles and sustainable agriculture, Extremophiles and Astrobiology

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