

# Medicinal Applications of Extremophilic Secondary Metabolites

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## ABSTRACT

Extremophiles are microorganisms which naturally occupy ecological niches in the most extreme environments in the world, such as polar regions, hydrothermal vents, hypersaline waters, deserts, and areas with heavy radiation, to name a few. An incredibly diverse group, extremophiles have adapted to their environments through the development of various specialized structures, secondary metabolites, and biochemical pathways, which allow them to survive and compete within their niche. The investigation of these unique biochemical adaptations has historically lent itself to countless breakthroughs in biotechnology and medicine. Extremophiles are particularly sought after for their incredible physical and chemical stability under extreme conditions, which offers great promise in the field of drug discovery and development. Additionally, recent isolation of various extremophilic secondary metabolites has revealed a vast array of medicinally applicable qualities, including anti-tumor, anti-inflammatory, antioxidant, antiviral, and antimicrobial properties. However, only a small fraction of extremophiles have been discovered thus far, and an even smaller fraction have been successfully isolated, thus leaving the vast majority of the remaining microorganisms entirely unknown and uncharacterized. A review of medicinally relevant extremophiles, and their secondary metabolites, is therefore provided with the hope of emphasizing their value in human health and the value of further extremophile discovery.

**Keywords:** Extremophiles, Secondary metabolites, Medicinal applications

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