Chapter 1
Extremophiles: Subsistence of an Extreme Nature Enthusiast

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ABSTRACT

Extremophiles are extreme nature devotees, mostly bacteria and archaea, which bloom with extreme environmental parameters like temperature, pH, pressure, and salinity. Extremophiles are responsible for the beginning of geographical structures throughout the evolution and establishment of all presently known ecological units. They are classified into several categories like acidophiles, alkaliphiles, psychrophiles, thermophiles, xerophiles, piezophiles/barophiles, halophiles, and many more, as given in this chapter. The subsistence of these microorganisms in extreme environments produces extremolytes and extremozymes that have the potential of valued resources for the enlargement of a bio-based economy. In addition to their solicitations, extremophiles offer treasured information regarding the physiochemical limitations of natural life. This chapter mainly evaluates extremophiles, the classification of extremophiles, and their biotechnological applications in grey, white, and red biotechnologies with the perspective of exploring celestial life.

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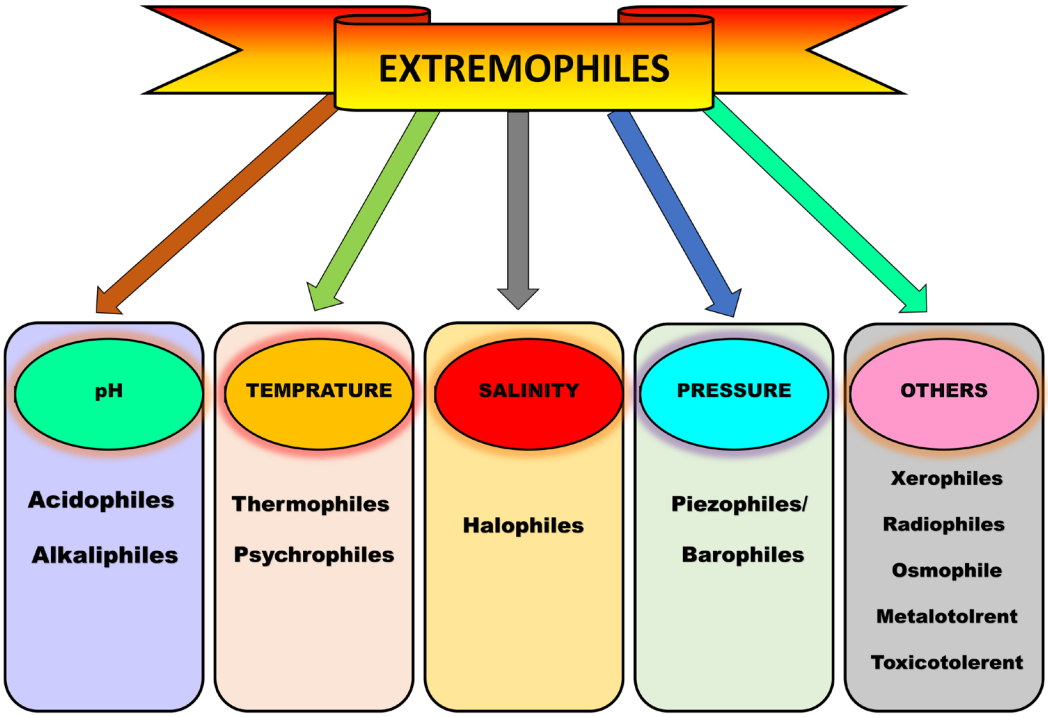
INTRODUCTION

Extremophiles are extreme nature devotees mostly bacteria and archaea which blooms with extreme environmental parameters. Extremophiles from prokaryotic genera were the first evidence for the life on Earth which are responsible for the beginning of geographical structures throughout the evolution and establishment of all presently known ecological unit. (Pikuta, Hoover et al., 2007)

Extremophiles can endure and bloom in punitive surroundings executed by physical i.e. pressure, radiation, and temperature and natural chemical immoderations i.e. desiccation, oxygen levels, redox potential, salinity and pH. Providentially, there are many extremophiles that flourish in life-threatening surroundings that are found in environment and deals with an outstanding source of auxiliary enzymes in lieu of mesophilic ones (Cullen and MacIntyre, 2016) presently which contests the typical functions of live hood. (Stan-Lotter and Fendrihan, 2012, Shrestha, Chilkoor et al., 2018) to withstand this surroundings they possess temperature stable proteins (thermos, cold stable) enzymes to withstand varying pH and certain secondary metabolites to defend radioactivity based on that they are classified in to various categories as given in Fig. 1 (Irwin, 2020).

Figure 1. Types of extremophiles based on various environmental parameters



The parameters under which life can survive have been pushed in every direction during the last century, embracing greater swaths of extreme environments. Microorganisms can live in a wide range