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Microbial mats and the search for minimal ecosystems.

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Abstract

This article reviews some ecological concepts common to all kinds of ecosystems, describes the characteristics of microbial mats, and focuses on the description of the Ebro Delta microbial mats, to assess whether they fit the concept of a minimal ecosystem. First, microorganisms as components of ecosystems are considered, and some features of microbial life, including ubiquity, size and metabolism, genetic versatility, and strategies to overcome unfavorable conditions, are discussed. Models for ecosystems, regardless of their size, have the same basic components; tropical forests, multilayered planktonic microbial communities, and benthic microbial mats are analogous ecosystems at different scales. The structure--in terms of populations and communities--and ecophysiology of microbial mats are also discussed. The linear distribution of microbial populations along steep gradients of light and hydrogen sulfide allows for the simultaneous presence of different microbial populations. Defining the minimal ecosystem requirements necessary for the survival and proliferation of organisms is crucial in the search for extraterrestrial life and for establishing ecosystems beyond the Earth.

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