

POLAR MICROBIOCENOSSES IN THE AGE OF GLOBAL WARMING

Summary

Polar ecosystems host diverse terrestrial and marine microbial communities. Three terrestrial microbial habitats explored here are glacier, glacier foreland and marine coast. Three sites within the bounds of the glacier were distinguished, specifically supraglacial (glacier surface), englacial (in the glacier), and subglacial (glacier bed). Microbial cells in the supraglacial environment thrive through photosynthesis, and cooperate with each other to create microbial consortia. In subglacial sites, microorganisms use organic matter incorporated earlier into the glacier bed or derived more recently from the surface through crevasses and sink holes. As glaciers recede in response to the warming climate, the ground below them is gradually exposed. This ground, initially inhabited by microbes that survive the melting, undergoes a succession process. Li-

chens, mosses and grasses begin to occupy stable areas unaffected by cryoturbation (freeze-thaw), with bacteria aiding colonization of the arid post-glacial soil. In places subject to erosion and where plant coverage is lacking, bacterial communities resistant to the harsh abiotic conditions develop. A source of such microorganisms is the fertile coast, where significant amounts of marine-derived material in the form of guano and macroalgae debris accumulate. Bacterial decomposition of this matter proceeds through several stages, initially by direct absorption of simple compounds, and subsequently by enzymatic breakdown of complex biopolymers such as chitin or cellulose. Such nutrients aid tundra ecosystem development not only in the vicinity of the coast, but also on postglacial moraines.