THE METABOLISM OF THE ANTARCTIC CRYTOENDOLITHIC MICROBIOTA

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The carbon metabolism of the cryptoendolithic microbiota in sandstones from the Ross Desert region of Antarctica was studied *in situ* and *in vitro*. Organic and inorganic compounds were metabolized by the microbiota, with bicarbonate being metabolized maximally in the light. There was a linear response of photosynthesis to light up to 200–300 μmole photons $m^{-2}s^{-1}$. The community photosynthetic response to temperature was a minimum at –5° C, two optima at +5 and +15° C and a maximum at +35° C. Photosynthetic metabolism occurred maximally in the presence of liquid water, but could occur in an environment of water vapor. Biomass of the cryptoendolithic microbiota was measured as the amount of lipid phosphate present. The *in situ* biomass ranged from 1.92 to 3.26 g carbon m^{-2} of rock and was 2 orders of magnitude less than epilithic lichen microbiota from Antarctica in a location 7° more north in latitude. With these data, it was possible to calculate primary production and carbon turnover in this simple microbiota. Production values ranged from 0.108 to 4.41 mg carbon $m^{-2}yr^{-1}$, while carbon turnover values ranged from 576 to 23,520 years. These values are the lowest and longest yet recorded for any ecosystem on Earth. If life did evolve on Mars to the level of prokaryotes or primitive eukaryotes, the possibility that the organisms "retreated," to the protection of the inside of the rock so that metabolism could continue during planetary cooling, cannot be overlooked.