

Cyanobacteria: Pioneers of Planet Earth

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ABSTRACT

Cyanobacteria are among the earliest of inhabitants of Planet Earth and their existence can be traced back to 3.8 billion years. Their oxygenic photosynthesis led to the gradual conversion of the Earth's atmosphere from an anaerobic to an aerobic one. This change enabled the advent of aerobic organisms that eventually underwent rapid evolution and became the dominant, highly diverse members of the current global biodiversity. Cyanobacteria are ubiquitous in their distribution and are found in all the latitudes from Arctic and Antarctic regions to the Tropical deserts perhaps reflecting their pioneering habitation of the primitive earth. They are also unique in their ability to simultaneously perform oxygenic photosynthesis and oxygen labile nitrogen fixation. Through these processes they make significant contributions to the Carbon and Nitrogen bio-geochemical cycles, particularly in the deep oceans. The ability of these organisms to fix N₂ either independently or in symbiosis with other organisms not only contributes to natural ecosystems but is applied in certain countries particularly for rice cultivation. Their ability to grow in highly polluted environments is also used in the treatment of sewage and industrial effluents. Cyanobacteria are the most efficient among all living organisms in the harvesting of solar energy and are currently looked at as highly attractive candidates for biofuel production. A few species are being used for the production of highly nutritive food supplements. On the negative side, some cyanobacteria form massive growths called 'blooms' in water bodies and many of them produce toxins harmful to fish, digastric animals and are suspected to be responsible for certain human ailments. Having reviewed most of these aspects of cyanobacteria, it is concluded that knowledge on these little known organisms would be invaluable not only for students, scientists and environmentalists but also for industrialists and policy makers.

Key words: cyanobacteria, blue-green algae, algal toxins, biofertilizers, biofuels