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BLUE-GREEN CYANOBACTERIA PLECTONEMA BORYANUM UTEX B 485 CULTIVATION  
UNDER LOW PRESSURE ANAEROBIC CONDITIONS (WITH A HIGH CONTENT OF CARBON  
DIOXIDE) SIMULATING MARTIAN ATMOSPHERE

**Abstract**

The composition of the atmosphere of Mars resembles the atmosphere of Earth from approximately 3 billion years ago. Its prevalent compound is carbon dioxide (CO<sub>2</sub>), estimated to account for 95.32% of the atmosphere. The remaining atmospheric components are nitrogen (N<sub>2</sub>) at 2.7%, argon (Ar) at 1.6%, oxygen (O<sub>2</sub>) at 0.13%, carbon monoxide (CO) at 0.08% and the residual compounds: water, nitrogen oxide, neon, hydrogen-deuterium-oxygen, krypton and xenon. Atmospheric pressure on Mars is significantly different than on Earth, and it is estimated between 6 to 10 mbar. In such conditions water evaporates in temperatures between 0.5 degrees Celsius (6 mbar) and 6.8 degrees Celsius (10 mbar). Plactonema boryanum is a photosynthetic, psychrophilic blue-green cyanobacteria with the ability to bind free nitrogen under anaerobic conditions. In this study we describe setting of a cyanobacteria Plactonema boryanum UTEX B 485 culture under atmospheric conditions simulating the Martian atmosphere. A dedicated equipment controlling pressure (8mbar) and temperature (3 degrees Celsius), was created for this study, and supplied with a gas mixture containing 95.5% CO<sub>2</sub>, 3% N<sub>2</sub>, and 1.5% Ar. The culture medium was mixed using magnetic stirring and illuminated 12h per day with white light at 590W/m<sup>2</sup> of the bioreactor surface. Cyanobacteria were cultivated for 7 days, after which the concentration of CO<sub>2</sub> and O<sub>2</sub> in the bioreactor was measured. The biomass was collected by centrifugation and its amount was determined. The results of this study may contribute to the development of the procedures of primary terraformation of Mars, especially in terms of changing the carbon dioxide to oxygen ratio in the atmosphere.