

«Spirulina» Experiment

INFLUENCE OF MICROGRAVITY
ON STRUCTURAL-FUNCTIONAL ORGANIZATION OF CYANOBACTERIA

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The purpose of the experiment is to study the microgravity effects on growth, morphology, ultrastructure, biochemical parameters and photosynthesis of cyanobacterial cells of *Spirulina platensis* and *Nostoc linckia*. Such a research is important for understanding the carbon dioxide transport into living cell under microgravity. Cyanobacteria will be grown in the presence of different concentrations of bicarbonate. The microgravity effect on carbonic anhydrase activity will be studied, and the correlation between activity of this enzyme and growth of cyanobacteria, amount and dimensions of gas vacuoles, which are responsible for motion of cyanobacteria in gravity, will be established.

Cyanobacteria grown in space flight and in

the ground control will be analysed by light and electron microscopy (trichome dimensions, degree of growth, ultrastructural changes, amount and size of gas vacuoles). Biochemical analysis will be performed by TLC and HPLC chromatography, polarography, and electrophoresis, as well as by enzymatic analysis of carbonic anhydrase activity.

The obtained results will allow understanding how microgravity affects primitive organisms of cyanobacteria. The role of gas vacuoles in gravity perception and adaptation of cyanobacteria to microgravity will be established, and the mechanism of carbon dioxide transport into living cell realized under microgravity, will be revealed.

«Polymorphism» Experiment

INFLUENCE OF MICROGRAVITY ON STRUCTURAL-FUNCTIONAL
ORGANISATION OF UNICELLULAR AND COENOBIAL GREEN ALGAE

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The influence of long-term microgravity on cell structural and functional characteristics of some algae species, as well as a possibility of their usage in CELSS will be studied. The main objectives are the following:

- search of potential objects for utilization in manned space system, where algae will have a regenerative role (primarily, morphological and reproductive characteristics of algae);
- study of behaviour, structural and functional peculiarities of potential objects in altered gravity for biotechnological applications;
- study of the microgravity effects on growth and

development of green algae species.

To meet these objectives, use of green algae *Scenedesmus armatus* (Chod.) Chod. and *Pediastrum boryanum* (Thurp.) Menegh. is proposed. These species of algae, which are successfully used in biotechnology, have never been studied in space. The methods of light and electron microscopy will be used.

The data obtained in this experiment will greatly enhance our knowledge in the field of theoretical and applied psychology, taxonomy, biotechnology and space botany.