

«Protonema» Experiment  
**GROWTH AND MORPHOGENESIS OF MOSS PROTONEMA  
IN MICROGRAVITY**

**Demkiv O. T.**

*Institute of Ecology of the Carpathians, NAS of Ukraine  
4 Kozelnytska St., Lviv 79036 Ukraine  
tel: (380) +322 +725809, fax: (380) +322 +427430, e-mail instecoc@cscd. lviv.ua*

The objectives of the experiment are to study the role of gravity in realization of growth and form-developmental processes in mosses. We plan to:

- study the role of gravity in plant movements;
- study the interaction of different stimuli, i. e., endogenous (structural and genetic determination) and exogenous (light and gravity) in realization of these processes;

- select and test new systems (different moss species and mutants).

Three well-known moss species, *Ceratodon purpureus* (Hedw.) Brid., *Pottia intermedia* (Turn.) Fühnr. and *Pohlia nutans* (Hedw.) Lindb. will be used in experiments with protonemata. The specific moss capsules *Bryum argenteum* Hedw. and *Funaria hygrometrica* Hedw. will be also used to study

the role of gravity in formation of species. We intend to use microscopic analysis, measurement of gravity bending of protonemata, cytochemical analysis of  $\alpha$ -amylase and glucose-6-phosphatedehydrogenase activity; cytofluorometrical analysis of free and membrane-bound  $\text{Ca}^{2+}$  and intracellular pH, immunofluorescent analysis of microtubule distribution, electrophoresis of multiple molecular forms of enzymes.

New data will be obtained, concerning the nature of sensing the gravi-stimulus and its transduction into growth and form-developmental processes, as well as the influence of gravity and light on complex transformation of an apical protonema cell into three-dimensional gametophore bud.

«Greenhouse» Experiment  
**GREENHOUSE OF MODULAR DESIGN FOR SHORT-TERM  
AND LONG-TERM GROWING OF HIGHER AND LOWER PLANTS**

**Kordyum V. A.**

*Institute of Molecular Biology and Genetics, NAS of Ukraine  
150 Zabolotny St., Kyiv 03143 Ukraine  
tel/fax: (380) +44 +2662024, e-mail: alf@imbg.kiev.ua*

It is planned to manufacture the modular greenhouse of a variable configuration and sizes depending on requirements to experiments.

The modular greenhouse with the variable geometry will consist of three devices — «lower», «middle» and «upper». These devices will be functioning both as one unit and as separate units. The «lower» device will consist of the panel with joints. The trays will be connected at right angles to the panel. The replaceable modules for cultivation (hardware for growing the plants) will be placed on the trays. The units of fastening of these modules will be joined to the power and telemetry systems

connectors. The number and configuration of the trays will depend on the number of experimental modules placed on them. The «middle» device will be equipped with two joined cantilevers for connection to the consoles. The power supply and telemetry lead, which come to the joints, will be placed inside the cantilevers. Each of the consoles will be equipped with two fastening units for joining the greenhouse blocks. All the power systems for the greenhouse blocks will be fastened on the lateral sides of the consoles. The greenhouse blocks will incorporate the ware for the raising. The «middle» device will be used to fulfil (monitor) various technological tasks

and to prepare the planting material for the third device. The «upper» device will consist of the panel with one unit of fastening for one console with one greenhouse cell. The service lines for the greenhouse block will be placed at lateral sides of console. The technological greenhouse hardware will allow

creating the green plant raising conveyer for the crew nourishment.

The modular greenhouse with the variable geometry is intended to experiment with plants and to optimise the technology of the fresh green nourishment.

**«Homeostasis 1» Experiment**  
**INFLUENCE OF HYPERGRAVITY, MICROGRAVITY**  
**AND IONIZED RADIATION ON THE STATE**  
**OF OXIDANT-ANTIOXIDANT HOMEOSTASIS OF RATS**

**Baraboj V. A., Zinchenko V. A.**

*Institute of Oncology and Radiology, Ministry for Health Protection*  
*33/43 Lomonosova St., Kyiv 03022 Ukraine*  
*tel: (380) +44 +2633062, fax: (380) +44 +2660198*

The purpose of the experiment is to examine the activity of antioxidant (AO) systems of the organism, as well as intensity of peroxidation of lipids (POL) in organs and blood of the rats in different periods after the space flight. The complex of antioxidants containing a dietary supplement ( $\beta$ -carrotin,  $\alpha$ -tokoferol, complex of catecholamines and ascorbic acid) and/or parenterally injected drugs will be used as a means for normalization of oxidant-antioxidant homeostasis of rats during a space flight.

The intent is to examine the indices of oxidant-

antioxidant homeostasis in blood and organs (brain, liver, spleen, small intestine) of rats: content of TBA-active products of POL, oxidant hemolysis of erythrocytes, activity of AO-enzymes (superoxide-dismutase, catalase, glutathion-reductase), content of  $\alpha$ -tokoferol and restored glutathione, as well as non-protein thiol groups. Impact of hypergravity on the same indices in blood and organs of rats will be studied in the ground-based laboratory.

The results of the experiment will be helpful to optimize the vital functions of astronauts during space flights.