

«Messengers-2» Experiment

**ROLE OF POLYPHOSPHATIDYLINOSITOLS
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The purpose of the experiment is to clarify mechanisms by which plants perceive several environmental stimuli, especially gravity, and respond to them. It is important from this point of view to clear up the primary biochemical processes occurring with phosphatidylinositol sensor signal system under altered gravity and during the adaptation to microgravity. The metabolic changes of key components of phosphatidylinositol cycle — PI(4)P and PI(4, 5)P₂, as well as changes of their hydrolyzing products content — Ins(1, 4)P₂ and Ins(1, 4, 5)P₃ in response to gravity will be studied, in order to

determine the role of phosphatidylinositol cycle in the primary reactions of gravity perception. Changes in phospholipase mRNA in the plant cells will be also studied in microgravity.

Objects of investigations are the etiolated seedlings of wheat and maize. Use in vivo of radiolabelling, as well as thin layer chromatography, anion exchange chromatography and autoradiography is proposed.

The influence of microgravity on the milestones of phosphatidylinositol signal pathway and lipid metabolism will be established.

«Photosynthesis-1» Experiment

INFLUENCE OF MICROGRAVITY ON PHOTOSYNTHESIS PROCESS**Volovik O. I.***Institute of Plant Physiology and Genetics, NAS of Ukraine**31/17 Vasylkivska St., Kyiv 03022 Ukraine**tel: (380) +44 +2635160, fax: (380) +44 +2635150*

The purpose of the experiment is to study the effects of microgravity on the efficiency of functioning of the electron transfer chain of chloroplasts and on the formation of light-stage photosynthesis products, ATP and NADPH in the chloroplasts and their accumulation in leaves of pea and barley plants. The main objectives are the following:

— to establish interrelations between the formation of ATP and NADPH and the direction of the dark carbon metabolism (14CO₂ incorporation into primary photosynthesis products) and the quality of plant biomass as well;

— to compare changes of primary photoprocesses with changes in the chloroplast ultrastructure and the ratio of main pigment-protein complexes as well;

— to study peculiarities of regulation of the light photosynthesis stage at the level of separate electron transfer chain components (water-splitting complex, QB-centers, plastoquinones, cytochrome b/f complex), as well as changes in electron transfer rates and ATP synthesis induced by the phosphorylation of thylakoids membrane proteins.

The methods of polarography, spectrophotometry, bioluminescence, biochemistry, isotope and inhibitory analyses will be used.

The experiment will permit revealing the elements of the photosynthetic process, which are the most sensitive to space flight factors. Research will result in modification of the plant cultivation technology in long-term space flights.