

«Photosynthesis-2» Experiment

INFLUENCE OF MICROGRAVITY ON OXYGENIC PHOTOSYNTHESIS

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The purpose of the experiment is to study the polypeptide composition, content of tightly and loosely bound manganese and calcium in OEC, as well as the role of three peripheral polypeptides with molecular masses of 33, 24 and 18 kDa in the process of oxygen evolution during cultivation of plants on board the space station.

The main objectives are the following:

- to estimate oxygen evolving activity of the PS II particles using Clark-type electrode and phenyl-p-benzoquinone as electron acceptor;
- to perform spectroscopic analysis of the PS II particles (samples will be analysed in oxidised and reduced forms);

— to carry out electrophoretic and chromatographic analysis of the polypeptide composition of the PS II;

— to determine manganese and calcium content using EPR spectrometry and fluorescent Ca probe, respectively;

— to study susceptibilities to proteinases (trypsin and chemotrypsin) of two classes of the OEC manganese.

The methods of polarography, spectrophotometry, gel-electrophoresis, chromatography, EPR spectrometry will be used.

Principal result of this experiment will be the new data on peculiarities of the oxygen evolution process in microgravity.

«Ethylene» Experiment

ROLE OF ETHYLENE AND ABSCISIC ACID
IN BIOLOGICAL EFFECTS OF MICROGRAVITY

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The purpose of the experiment is to study the influence of microgravity on the endogenous levels of ethylene and abscisic acid in radish, potato and onion plants during a long-term space flight. It is supposed that ethylene and abscisic acid can participate in plant responses to the action of microgravity.

Seeds of radish and onion, the onion bulbs and potato tubers will be used. Bulbs, potatoes and seeds will be germinated in the greenhouse on board the URM. Ethylene production rate will be monitored daily by taking air into flasks sealed with rubber serum caps. Ethylene concentration in flasks

will be analysed by withdrawing a gas sample with a syringe and injecting it into a gas chromatograph. To determine ABA, the plant material from leaves will be collected, extracted by ethanol and stored till the end of experiment. ABA levels will be determined by HPLC. A part of these plants will be taken at the end of experiment and sent back to the ground-based laboratory for further study.

New data concerning the growth and development of plants in microgravity, in particular, the anticipated participation of ethylene and ABA in plant gravisensitivity, will be obtained.