— to establish the impact of altered gravity on the cytoskeletal protein genes expression during development of graviperceiving and graviresponding root cells;

To met these objectives, the following methods will be applied: electron, light and fluorescent microscopy, dot and in situ hybridization techniques, immunohistochemistry and fluorescent dyes staining.

This research will be carried out for the first time. The intent is to obtain comparative characteristics of cytoskeleton arrangements in two cell lines originating from two different types of root meristem (root cap meristem and apical root meristem, accordingly). It will be important for establishment of the role of cytoskeleton in histogenesis of graviperceiving and graviresponding root sites and, consequently, in the process of gravisensing. Study of calcium homeostasis during the specification of graviperceiving and graviresponding plant cells, as well as study of expression of cytoskeleton genes will promote the definition of the signal-transducing pathway for gravity in plant roots.

«Membranes» Experiment

PHYSICAL-CHEMICAL PROPERTIES OF BIOLOGICAL MEMBRANES UNDER MICROGRAVITY

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The experiment is aimed at performance of complex investigations of physical and chemical properties of the cytoplasmic membrane of plant cells at the molecular level under altered gravity and understanding the mechanisms supporting its microviscosity within certain limits under altered gravity, i. e., homeoviscous adaptation of plant cells to altered gravity.

The main objectives are the following:

— to develop a new method of fluorescence probes, which will allow measurement of the dynamic changes in microviscosity of the model and native biomembranes;

— to develop new highly sensitive and specific fluorescence probe-molecules for their incorporation into biomembranes;

— to develop a special and original mini-device for measuring microviscosity on board the space station;

— to work out procedures of recurrent measurement of biomembrane's microviscosity during a space flight according to a special program;

The methods of ultracentrifugation, extraction, fractionating, thin-layer chromatography, gas-liquid chromatography, and modified fluorescence probes will be used. The results obtained will promote an understanding of the physical-chemical properties of biomembranes under altered gravity, and the mechanisms of homeoviscous adaptation of plant cells to microgravity.