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Biology in Space (7)

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RESEARCH ON LIFE SCIENCES AND BIOTECHNOLOGY OF CHINESE MANNED SPACE PROGRAM

Abstract

China has been dedicated to the development of space science research and applications since the start of Chinese Manned Space ProgramCMSPin 1992. Space life science and biotechnology was one of main scientific research fields in CMSP, major areas including as follows: 1) fundamental space biology, research on protein structure and function, biological effect study of space environment of gene regulation based on functional genomics, cytobiology studies and etc.; 2) studies and applications of cell biotechnology and biomicramolecule techniques, space protein and biomacromolecule crystal growth; animal and plant cell space culture; cell fusion; space separation and purification of cell or biomacromolecule; 3) traditional biological problem and techniques in advanced life support system, ALSS, including the influences and regulations of space environment on organisms and the research of advanced space ecological equilibrium system. Studies were conducted and a lot of outcomes were obtained during these years. For example, on Board Chinese Spacecraft SZ-8, differential protein expression profiling of *Arabidopsis thaliana callus* under microgravity were studied; changes in Plastid and Mitochondria Protein Expression in *Arabidopsis Thaliana Callus* were investigated. A closed aquatic ecosystem (CAES) was developed to study the effects of microgravity on the function of closed ecosystems aboard the Chinese retrieved satellite and on the spacecraft SHENZHOU-II. In the droplets thermocapillary transition experiment, a good result is obtained on the measurement of Reynolds number. In the protein crystal growth experiment, the results of three types of protein mass (diffracting power) are better than the best results got before. In the future field of space life science and biotechnology, projects planned are committed to explore the life phenomenon under the space particular environment (microgravity, radiation and etc.). The methods of genomics, transcriptomics, proteomics, metabonomics and phenogenetics in modern biology are conducted in the researches, in order to reveal the responses mechanism of space environmental factors and obtain the breakthrough of recognition, promote the development of modern biology. Projects also involve the important space biotechnology, radiating mutation breeding techniques, ecological life support techniques, biomechanics, sub magnetic biology and etc. The outcomes of these investigations will transform to modern agriculture, modern medicine, which helps us with human health and development of society and lays a foundation for long-term space exploration.