

Accepted Manuscript

Planetary Protection Challenges In Space Exploration Missions And Ways Of Their Resolution With Account Of Russian Exobiology Experiments

O.I. Orlov, N.D. Novikova, N.A. Polikarpov, M.A. Levinskikh, E.A. Deshevaya, M. Sugimoto, V.R. Alekseev, T. Okuda, O.A. Gusev, V.N. Sychev

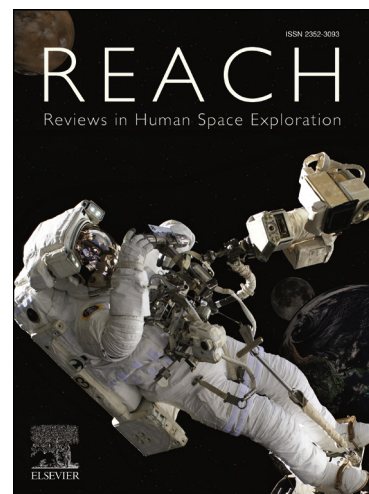
PII: S2352-3093(17)30011-1
DOI: <http://dx.doi.org/10.1016/j.reach.2017.07.001>
Reference: REACH 18

To appear in: *Reviews in Human Space Exploration*

Received Date: 5 April 2017
Revised Date: 3 July 2017
Accepted Date: 24 July 2017

Please cite this article as: O.I. Orlov, N.D. Novikova, N.A. Polikarpov, M.A. Levinskikh, E.A. Deshevaya, M. Sugimoto, V.R. Alekseev, T. Okuda, O.A. Gusev, V.N. Sychev, Planetary Protection Challenges In Space Exploration Missions And Ways Of Their Resolution With Account Of Russian Exobiology Experiments, *Reviews in Human Space Exploration* (2017), doi: <http://dx.doi.org/10.1016/j.reach.2017.07.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



**PLANETARY PROTECTION CHALLENGES IN SPACE EXPLORATION
MISSIONS AND WAYS OF THEIR RESOLUTION WITH ACCOUNT OF RUSSIAN
EXOBIOLGY EXPERIMENTS**

O.I. Orlov, N.D. Novikova¹, N.A. Polikarpov¹, M.A. Levinskikh¹, E.A. Deshevaya¹,
M. Sugimoto², V.R. Alekseev³, T. Okuda⁴, O.A. Gusev^{5,6}, V.N. Sychev¹

1 – Institute of Biomedical Problems of Russian Academy of Sciences, Moscow, Russia (IBMP)

2 - Institute of plant science and resources, Okayama University, Okayama, Japan

3 – Zoological Institute, of Russian Academy of Sciences, St.-Petersburg, Russia

4 - National Institute of Agrobiological Sciences, Tsukuba, Japan

5- Institute of Fundamental Medicine and Biology, Kazan Federal University, Kazan, Russia

6 – RIKEN, Yokohama, Japan

1. Introduction

In view of recent flights of space probes to other planets of the solar system, many space agencies have incorporated search for extraterrestrial life or its predecessors into their research programs. However, deep space missions are fraught with high risks of disseminating terrestrial life forms, which may have unexpected consequences. Propagation of and contamination by Earth's life forms, mainly microorganisms with their unprecedented resistance to extreme environments, may exclude the possibility of exploring planets in their pristine conditions. Of greater concern is potential Earth's contamination by extraterrestrial organisms or by terrestrial pathogenic microorganisms that were transformed during their exposure to the space environment and brought back to Earth.

Understanding the necessity of investigating planets in their unaltered state led to the concept of planetary protection or planetary quarantine, which was put forth by an international nongovernmental organization, viz., the Committee on Space Research (COSPAR) established in 1958. The concept was first formulated at the COSPAR Assembly in 1964 [1], and the final version was adopted by the COSPAR Resolution of 2002 [2].

This document forms the basis of procedures aimed at protecting planets from contamination by terrestrial microorganisms as well as at protecting Earth from back contamination by returning vehicles. However, planetary protection cannot be achieved without a comprehensive study of microbial survival in open space. Relevant studies are important not only for natural sciences theories but also for the practical implementation of efficient planetary protection measures.

Download English Version:

<https://daneshyari.com/en/article/5497457>

Download Persian Version:

<https://daneshyari.com/article/5497457>

[Daneshyari.com](https://daneshyari.com)