

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Life Support and EVA Systems (6)

Author: Mr. Paul Fomkin

Moscow Aviation Institute (State Technical University), Russian Federation, lucascan@novafilm.tv

Prof. strogonova lubov

Moscow Aviation Institute (State Technical University), Russian Federation, strogonova@comtv.ru

Dr. Svetlana Poddubko

Institute of Biomedical Problems (IBMP), Russian Academy of Sciences (RAS), Russian Federation,
svpoddubko@yandex.ru

Mrs. Natalia Novikova

Institute for Biomedical Problems, Russian Federation, novikova@imbp.ru

MICROBIOLOGIC PATTERN RECOGNITION IN MANNED SPACE VEHICLE AND STATIONS

Abstract

During longtime space flights and interplanetary missions, such as self-regulated human vital activity on the road to the Mars, among numerous outboard risks, the crew faces onboard microbiological intruders as well. There is no way to send biological tests for the analysis to the Earth in such missions, so special onboard system of methods and activities must solve two different problems: sampling different types of bacteria and fungus and perform independent analysis of collected material without professional microbiologist among the crew and any help from the Earth.

So we meet an interesting task – our system must minimize human factor and rely mostly on computing machinery. In order to use pattern recognition method, we need to perform proper tests sampling and prepare them for the machine analysis. As a matter of fact, computer “see” only flat picture, so called monolayer, which is not very suitable for the quality recognition. Therefore, stereoscopy is the only way to achieve our goal.

In 2007-2008 Federal Unitary State Enterprise Institute of Space Device Engineering together with State Research Centre of Russian Federation - Institute for Biomedical Problems Russian Academy of Science manufactured the device of express diagnostic, “Microflora”, designed to collect and study microbiological samples. It consists of thermostat and Petri dishes with growth medium.

Apart from tests sampling it is necessary to develop modified mathematical model for pattern recognition of bacteria and fungus, which were found during the flight. For that reason primary mathematical model, describing monolayer was created. Its main shortcoming – absence of stereoscopy, thereby pattern recognition lack for accuracy and integrity. So, the scheme of improved model, based on the primary model was developed.

Still, we have a lot of work to do but the result of our research could become common use not only in space sector, but also in clinical medicine as well.