INVESTIGATION OF MICROBES IN THE STRATOSPHERE – STARDUST PROJECT

[1]DOMINIKA TOMASZEWSKA, [2]KACPERLORET, [3]KAROL PELZNER, [4]SZYMON MAGRIAN, [5]MARCIN JASIUKOWICZ

[1,2]Faculty of Mechanical Engineering
[4]Faculty of Electronics, Telecommunications and Informactics
[5]Faculty of Electrical and control Engineering
Students from Gdańsk University of Technology ,Poland
E-mail: [1]dt.dominika.tomaszewska@gmail.com, [2]kaclor54@gmail.com, [3]karol.pelzner@gmail.com, [4]szymon.magrian1@gmail.com, [5]contact@yasiu.pl

Abstract - The stratospheric microbiota has been investigated many times using the methods of classical microbiology. In this research a few modern methods, including NGS sequencing and multiple displacement amplification of DNA, were in use. The analysis of metagenome helped to determine the content of various species of bacteria in the sample collected in the stratosphere by a hydrogen-filled balloon holding a gondola with specialistic apparatus. Also the comparison of DNA amounts in specimens collected in the stratosphere and in a ventilated room within a building has been done, which has shown that the stratospheric air is not poor in bacteria, unlike the previous notions suggested. By running experiments with a vacuum chamber, the possibility of destruction of bacterial cells due to a pressure shock during the fall of the gondola with the samples was disproven. Collected cells were unable to be cultivated on agar media in any temperature. The results of the metagenomic 16S rRNA coding gene sequencing revealed that a great amount of the collected DNA came from undescribed species. The most dominant genes among the known bacteria were Enterococcus, Staphylococcus and Bacillus. The microorganisms shall be collected in the stratosphere by a filtering system equipped with six filters divided into two equal subsystems. Two filters shall be placed between ever-closed valves as the control filters. Biological material shall be collected in the remaining four filters of which one shall be used for metagenome isolation. Three of them shall provide the microorganisms for setting up cultures on agar media. One of the control filters shall be treated like the one for metagenome isolation and the second one shall be treated similar to the ones used for setting up the cultures. The stratospheric microbiome shall be compared to the microbiome of the air collected from the place of the balloon's start.

Keywords - Microbiology, Exploration of the Stratosphere, Spaceexploration, Fluid Mechanics, Gpsconnectivity