VENUSIAN ELECTRIC BIOCELL (VEB) HYPOTHESIS. G. P. Slowik[1], A. Z. Stryjska[2] and P. Dąbrowski[3], [1]Institute of Materials and Biomedical Engineering, University of Zielona Gora, Poland (grzegslowik@o2.pl), [2]Duke University, USA, Duke Kunshan University, China, (azs4@duke.edu), [3]Division of Normal Anatomy, Department of Human Morphology and Embryology, Wroclaw Medical University, Poland (pawel.dabrowski@umw.edu.pl).

Introduction: Microbial fuel cells (MFCs) are a renewable and environmentally friendly way of obtaining electricity, having the ability to integrate i.a. with smart grids [1]. For the production of electricity in MFCs, the biocatalytical capacities [2] of terrestrial microorganisms are used. Microbial fuel cells can also generate electricity under anaerobic conditions [3]. The level of complexity of such microbiological systems may exceed that of electrochemical systems (4). MFCs can be unicellular and multicellular by connecting individual MFCs in series or in parallel to produce a higher electric current and a higher voltage [5]. In the anode chamber of microbial fuel cells, bacteria using electron donors transfer the obtained electrons to the anode [6]. The transfer of electrons to the anode occurs due to physical contact of membrane organelles or the cell membrane of these bacteria [7]. The electron mediation process in MFC can be based on the anaerobic respiration system Fe(II)/Fe(III) [7]. Bacteria capable of producing energy by microbial fuel cell technology include i.a. bacteria of the genus Acidobacteria and Firmicutes [8]. MFCs may differ due to size, design, type of cathode catalysts and electrode size [9]. There are about 100 known species of terrestrial microorganisms that are included in the electroactive category and for which there is no specific ecological niche [10]. Such a niche for extraterrestrial microorganisms, which are analogues of terrestrial, extremophilic electroactive bacteria, may be the lower layer of Venus clouds (47.5-50.5 km above its surface). There is nonzero probability of their survival [11] and potentially life in microbiological form may exist in the lower layer of clouds to date [12].

Model assumptions: Hypothetically existing electrical bacteria in the lower layer of Venus clouds can act as a biological anode, through an active mechanism of polarization of charges across the cell membrane, which can be based on the known mechanism of the hydrogen pump. Hydrogen is transferred inside the cell and an appropriate concentration of negative acid residue is maintained outside. The flow of charges on the principle of potential difference would take place in accordance with the principles of electrochemical cell systems, which corresponds to the author's concept of the Venusian electric biocell (VEB**),** referring to hypothetical life in the clouds of Venus. The whole process can take place in a small space within the particulate matter grains, which can act as a cathode (positively charged metals). Dust grains together with bacteria existing on their trusts form electrodes. A system of connections is then created through the exchange of charges, conducive to the formation and flow of current as in a giant cell. Therefore, it is possible to record local decreases, e.g. in negative charge in the clouds of Venus - this may be related to the reverse, temporal polarization of the anode and results directly from the natural rhythm of ion pumps in the cell membranes of bacteria (potentially forming a huge colony). Another hypothesis related to the existence and flow of electric current may be based on the mechanism of propagation of charges as a result of polarization and depolarization of cell membranes of bacterial bodies and/or their cytoplasmic protrusions (bacterial electric cables hypothesis - BECH). Electrical networks/buses would then be created on dust grains, where the transport of charges would be based on the image of colonies of cable bacteria that exist in terrestrial conditions or the process of propagation of electrical impulses known in neurobiology in the network of nerve cell protrusions in higher organisms: axons and dendrites.

Summary: As in Earth's fuel cells (MFCs), with their anodes existing with a bacterial biofilm, there may be a similar mechanism in the lower layer of Venus clouds involving potentially extremophilic electrical microorganisms forming a macrostructure in the form of a giant biocell (bioaccumulator).

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