INFLUENCE OF CHEMOORGANOTROPH BACTERIA ON METEORITES IN VITRO

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Introduction: Tens of thousands tones of extraterrestrial matter fall to our planet every year as cosmic dust, micrometeorites and meteorites. From the biological point of view existence of extraterrestrial forms of life is of interest due to possibility of panspermia. Earth stages of meteorites matter history during interaction with free oxygen of atmosphere and liquid water is less investigated. This situation is applicable for microorganisms (living in soil and hydrosphere) impact especially. Microorganisms are able to increase speed of meteorite mineral destruction dramatically because of using them as source of energy (reduced compounds) or passive destruction for needed biogenic elements. Lithotripsie microorganisms are an example of getting energy by non-organic compounds oxidation. In areas of active organotroph microorganisms development (soil, water depositories) media acidity can vary seriously due to putrescence of organic matter. pH changing helps abiogenic mineral destruction. Most studies connected with this problem are dedicated to silicate bacteria involved to natural degradation of aluminosilicates. This group belongs to chemoorganotrophs. In contrast to lithotripsie they get energy from the organic compounds oxidation by free oxygen (mainly sucrose-like compounds). But they are able to extract needed bioelements (K, Na, S, P) for developments of their bodies from rocks or weathering products. In this work we tried to research meteorite destruction under impact of clear cultures of silicate bacterias.

Experimental: Different samples of meteorites were chosen for analysis: Chelyabinsk (black lithology), Chelyabinsk (light lithology), Seymchan. These samples were provided by UrFU's Meteorite collection. Slices have been prepared. Then they were etched by 1% solution of HCl in alcohol for 40 minutes. Then they were washed with distiller water and were dried until they show constant weight.

Prepared samples were situated in sterile nutrient medium of Zack with excluded aluminosilicates because of assuming that minerals of meteoritic samples will be act as a source of bioelements. The inoculum was microbiological culture of silicate bacteria *Bacillus mucilaginosus B* from the microbiology lab of UrFU's INS. Meteorites were exposed in growth bacterial culture at 10°C and for 4 week in thin layer of liquid medium. These conditions provided aerobic growth of bacteria. Biomass increasing were estimated using protein according to Bradford technique [1].

Results and discussion: Samples have been covered by mucous film after the end of experiment. These mean fouling of samples by bacteria cells. Destruction of meteoritic samples was estimated using their masses. Scanning electron microscopy has also been done.

Sample of the Chelyabinsk meteorite (light lithology) have lost more than one percent of it mass, Chelyabinsk sample from black lihology have lost 2.8%, Seymchan – more than 3%. Analysis of scanning electron microscopy images before and after bacterial impact confirm surface relief development due to destruction of meteoritic samples. One can assume that degree of surface changes in research area are determined by it mineral composition. Finish results are determined by non-uniformity of meteorite matter. All samples were subject to destruction by growth culture of silicate bacteria *Bacillus mucilaginosus B.*

We suppose small meteorites degrade faster than big ones because of surface/volume rate. That's why they will integrate into the Earth environment faster. Monolithic character of certain meteorite is crucial also (see for instance [2]).

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References: [1] Bradford M. M. 1976. Analytical Biochemistry 72:248–257. [2] Yakovlev G. A. et al. 2013. Abstract #5292. 76th Meeting of The Meteoritical Society.