

The limits of extremophilic life expanded under extraterrestrial environment-simulated experiments

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Abstract

Astrobiology is a brand new area of science that seeks to understand the origin and dynamics of life in the universe. Several hypotheses to explain life in the cosmic context have been developed throughout human history, but only now technology has allowed many of them to be tested. Laboratory experiments have been able to show how chemical elements essential to life, carbon, nitrogen, oxygen and hydrogen combine in biologically important compounds. Interestingly, these compounds are found universally. As these compounds were combined to the point of originating cells and complex organisms is still a challenge to be unveiled by science. However, our 4.5 billion years-old solar system was born within a 10-billion years-old universe. Thus, simple cells like microorganisms may have had time to form in planets older than ours or other suitable molecular places in the universe. One hypothesis to explain the origin of life on Earth is called panspermia, which predicts that microbial life could have been formed in the universe billions of years ago, traveling between planets, and inseminating units of life that could have become more complex in habitable planets like ours. A project designed to test the viability of extremophile microorganisms exposed to simulated extraterrestrial environments is ongoing at the Carlos Chagas Filho Institute of Biophysics to test whether microbial life could withstand those inhospitable environments. Ultra-resistant (known or novel ones) microorganisms collected from terrestrial extreme environments, extremophiles, have been exposed to intense radiation sources simulating solar radiation (at synchrotron accelerators), capable of emitting in a few hours radiation equivalent of million years

accumulated doses. The results obtained in these experiments reveal the interesting possibility of the existence of microbial life beyond Earth.

Keywords: panspermia, extremophiles, UV, cosmic dust, astrobiology

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