GROWTH OF DEINOCOCCUS RADIODURANS IN OILS AS SOLE SOURCE OF CARBON. G. Z. L. Dalmaso[1]; I. G. Paulino-Lima[1,2]; S. G. F. Leite[3]; A. C. Leitão[1] and C. Lage[1,2], [1]Carlos Chagas Filho Biophysics Institute, Federal University of Rio de Janeiro, Brazil (gdalmaso@biof.ufrj.br); [2]Department of Physics and Astronomy, The Open University, United Kingdom; [3]Chemistry School, Federal University of Rio de Janeiro, Brazil.

Introduction: Extremophilic organisms can survive and proliferate in extreme conditions such as high temperatures, salinity and pressure [1]. They are useful to a wide range of research areas, from basic microbiology to the development of industrial technology. *Deinococcus radiodurans* is one of the most radiation resistant organisms yet discovered, capable of surviving acute doses of ionizing radiation that exceed 15 kGy [2], and growing under chronically-delivered gamma radiation (60 Gy/h) [3] The molecular mechanisms underlying extreme radiation resistance in *D. radiodurans* have been the subject of basic research for decades [4, 5], but remain poorly definened. The prevailing hypotheses of extreme radiation resistance in *D. radiodurans* fall into at least two categories [4, 5, 6]: (i) a subset of uncharacterized genes encode functions that greatly enhance the eficiency of DNA repair; and (ii) non-enzymic Mn(II) complexes present in *D. radiodurans* protect enzymes from oxidation during irradiation [7], with the result that repair systems survive and function with far greater eficiency than in sensitive bacteria [8]. In applied research, *D. radiodurans* is a prospective candidate for bioremediation of radioactive environmental waste sites, based on its ability to grow and functionally express cloned genes during exposure to chronic gamma irradiation [9, 10]. For example, *D. radiodurans* has been engineered to completely degrade aromatic hydrocarbons (e.g., toluene) and reduce toxic metals (e.g., Cr^{6+}, Hg^{2+}) in the presence of ^{137}Cs [10]. In the United States, buried Cold War radioactive waste (3×10^6 m^3) has contaminated about 7×10^7 m^3 of surface and subsurface soils and about 3×10^{12} m^3 of groundwater [3]. The main point of this study was to investigate wether intrinsical biological properties of the poli-extremophilic bacteria *Deinococcus radiodurans* [11, 12] enable it to metabolize and bioremediate organic-compound-contaminated areas, avoiding the need of genetic engineering techniques. Besides the interesting perspective for bioremediation, our results also suggest that radiation resistant microorganisms such as *D. radiodurans* could proliferate in hydrocarbon-rich sites, which has implications for astrobiological research.

Methods: *Deinococcus radiodurans* R1 strain was cultivated in rich medium TGY [13] or in bioremediation minimal medium BG-11 [14] where organic-coumpounds were the only available carbon source. The culture was previously cultivated on 50ml Erlenmeyers containing 20ml of liquid medium at 30ºC, 200rpm for 48 hours. Cultures were transfered to another liquid medium and incubated for 24 hours in the same conditions. After that, 1ml aliquots were added to 24 wells-microplates containing: 20µl of the followingg oils: (i) gasoline, (ii) diesel oil, (iii) diesel oil without additives, (iv) sergipano oil and (v) arabic light oil. Those oils aren't soluble in liquid media, so they form a drop on the surface of the mixture. Sergipano oil and arabic light oil were added using a sterile stick because their viscosity. Samples were incubated at 28ºC without shaking for 30 days.

Results: Microbial growth was observed in many of the tested compounds, demonstrating a tolerance to a low concentration of these solvents, making it possible that when in low concentrations, they can be metabolized by *D. radiodurans*. Structural and morphological alteration of drop oils, as well as complete disappearing of some drops coupled to the microbial enrichmet were observed. The results obtained in this study demonstrate the proliferation of *D. radiodurans* in extreme environments, with high concentration of organic solvents. Moreover, these results suggest the potential use of a new class of microorganisms in the biodegradation and bioremediation of contaminated areas, minimizing the limitations imposed by Biosafety laws.

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