POSSIBILITY OF LIFE SUSTAINED BY RADIOACTIVE DECAY ON ICY MOONS. M. G. B. de Avellar[1] and D. Galante[2] and F. Rodrigues[3], [1]Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, São Paulo/SP, Brazil, Cidade Universitária, 1226, 05508-090 (mgb.avellar@iag.usp.br), [2]Laboratório Nacional de Luz Síncrotron (LNLS/CNPEM), Campinas/SP, Brazil (douglas.galante@lnls.br), [3]Departamento de Química Fundamental Instituto de Química, Universidade de São Paulo, São Paulo/SP, Brazil (farod@iq.usp.br).

Introduction: The amazing capacity of life to adapt itself endowed the so-called extremophiles with capabilities that are only now being discovered and studied, such the production of proteins stable at temperatures above at 100 ° C or the production of enzymes such as reverse gyrase, which can prevent the loss of biological activity of DNA, also due to high temperatures. In addition, other classes of beings are capable to extract energy from alternative sources, such as the reduction of iron or sulphate. In this work, we study the feasibility of microorganisms like the bacterium *Candidatus Desulforudis audaxviator* [1], an extremophile found in a gold mine in South Africa surviving at depths up to 4 km, with temperatures between 45^{o}C and 60^{o}C, few nutrients available and some concentration of radioactive minerals such as uraninite, to survive in satellites or in planets similar to the Jovian moon Europa by extracting energy from the radioactive decay of uranium, thorium and potassium. Knowing the metabolic pathway of *Candidatus Desulforudis audaxviator* we are developing a simple ecosystem model with the basic ingredients for support this kind of microbial life.

The bacterium extracts its energy from the reduction of sulphate (SO_2^{-4}). An identified source of SO_2^{-4} in this environment is radioactive in its origin: it comes from the oxidation and dissolution of pyrite (FeS_2) by H_2O_2 that, in turn, comes from the radiolysis of water by the radiation released by uraninite UO_2.

Lefticariu et al [4] have demonstrated the exposition of water and pyrite to a common source of gamma radiation provides a lower limit for the production of the necessary chemical ingredients for the bacteria to extract energy by oxi-reduction reactions of SO_2^{-4}.

We chose the Jovian moon Europa as our best model as modelled in reference [5], but extra suppositions about the abundances of uranium and thorium are made: we assume chondritic/Martian abundances for these two radioactive elements be present in the seabed and the formation of pyrite covering the some parts of rocky mantle where thermal vents are present.

Models for the origin, composition and evolution of the crust and ocean of Europa [6] suggest the formation of pyrite-like materials, being these a major component.

Our study shows that if ^{40}K is abundant in Europa, then we have there a very propitious place for the evolution and maintenance of such forms of life.

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