

Discovery of bacteria living on arsenic.

An unexpected discovery, but not overly so, commented by Prof. Ernesto Di Mauro of the Dept of Biology and Biotechnology “Charles Darwin” of Sapienza University of Rome and member of the Scientific Board of Istituto Pasteur - Fondazione Cenci Bolognetti.

Life is much more variable than what we might expect, and can follow totally unexpected paths, as in the case of the bacterium living on Arsenic, a notoriously poisonous element for all life forms on Earth. “This discovery shows the extreme ability of evolution to always find a solution”, noted Dr. Ernesto Di Mauro of the Dept of Biology and Biotechnology “Charles Darwin” of Sapienza University of Rome and member of the Scientific Board of Istituto Pasteur - Fondazione Cenci Bolognetti.

According to Dr. Di Mauro, there is no doubt that “the theoretical value of this find is of fundamental importance in demonstrating that life is much more versatile and capable of adaptation than what we might think”. Aside from the theoretical implications and the fascinating idea that alien life forms are possible, this discovery could have crucial effects on the biotechnology industry. It is remarkable how theoretical research of this kind can lead to new applications in the biotechnology industry so quickly. For example, it has become possible to modify bacteria for the creation of drugs and agents useful for the reclamation of contaminated soil. However, there’s more to it: “Endless possibilities open up, from the production of pharmaceutical compounds to petrol, fuel, alcohol and other substances that are very difficult to obtain through chemical synthesis. There is no doubt,” Dr. Di Mauro adds, “that the boundaries of ecology are a lot wider than what we imagine.”

It comes spontaneously to ask whether an Earth-like environment could exist in outer space, and if the existence of organisms similar to the ones which inhabit the Earth is plausible. Life on Earth is composed of six elements: out of these, hydrogen, carbon, nitrogen and oxygen are the most commonly found in the Universe, aside from sulphur and phosphorus.

“This last element, observes Dr. Di Mauro, is crucial for the formation of nucleic acids which are at the base of life, as are DNA and RNA”.

“Thought has always been given to the possibility of substituting phosphorous with other atomic structures because, in the field of biotechnology, there is an interest in creating microorganisms with a different DNA, perhaps a more efficient and stable one”, states the expert. “Until now”, he adds, “there have been positive results *in vitro*. It has been proven that it is possible to create nucleic acids using arsenic, vanadium or silicon, but it has never been demonstrated that this could effectively work as a biological mechanism. The research published on Science now suggests that this is possible”.