

The origin of life from inorganic matter and the cell formation: A NEW HYPOTHESIS ON THE ROLE TAKEN BY A WEAK ELECTROMAGNETIC FIELD

- [Linkedin](#)
- Data pubblicazione 28 marzo 2017



[Ettore Ruberti](#)

Ricercatore ENEA - Docente Universitario presso Università Ambrosiana - Direttore Dip. Biologia ed Ecologia di UNISRIRA

The origin of life from inorganic matter and the cell formation:

A NEW HYPOTHESIS ON THE ROLE TAKEN BY A WEAK ELECTROMAGNETIC FIELD (this paper was presented at Ferrara (IT) at the First Congress SIBE, august 2005)

Hypotheses on the origin of life on earth, in the presence of a reducing atmosphere, date back to the thirties and are attributed to Alexander I. Oparin and J. B. S. Haldane.

Other scientists, Richter and Harrenius, proposed that life was transported on Earth by meteorites.

Biological molecules have been found in meteorites, but this hypothesis, besides moving the problem of origin of life to another planet, appears to be difficult to support due to the extremely unlikely event that a meteorite falls at the right time in the right place.

It is possible that the first molecules capable of duplicating could have benefited from the substratum provided by rocks of volcanic origin, which are characterised by a weak electromagnetic field that has facilitated the establishment of their configuration (this hypothesis was suggested by Preparata).

In 1953 Stanley L. Miller, final-year student at the University of Chicago, in the laboratory of H.C. Hurey, set the bases of experimental research aimed to shed light on the conditions that determined the appearance of life on Earth.

Using a simple apparatus, conceived by himself, and the molecules that could have been present on the planet at pre-biotic time (methane, ammonia, water and hydrogen) and submitting these to continuous electric discharges, he obtained aminoacids.

In 1961, Juan Orò, at that time at University of Houston, while trying to simplify the experiment of Miller, obtained the formation, in addition to other molecules, of adenine.

In the seventies, Ponnampereuma, from the NASA Institute of Esobiology, succeeded in obtaining, through appropriate experiments, other constituents of the nucleic acids.

According to many scientists, the first molecule capable of self-replication could have been the RNA, the second nucleic acid that has the function of “translating” the genetic message for protein synthesis.

Even if recognising the very high probability of the RNA formation before that one of DNA, a fundamental question stays on how to explain the replication of a nucleic acid in the absence of proteins.

A possible explanation, that was experimentally demonstrated by James P. Ferris of the Rensselaer Polytechnic Institute, is that an ordinary clay, the montmorillonite, catalyses the oligonucleotides synthesis of the RNA.

Some scientists started to search for alternative genetic systems. Eschenmoser, for instance, obtained an alternative structure for ribose, the pyranosil-RNA that differs from the RNA sugar for the presence of an additional atom of carbon.

This reduces the amount of possible variation in the molecule. Peter E. Nielsen, University of Copenhagen, designed on the computer a polymeric molecule characterised by a protein skeleton and two lateral chains formed by the nitrogenous bases of the nucleic acids.

This molecule, a kind of protein RNA, is able to recombine stably with a complementary filament.

This means that also a protein code can act as a template for the construction of its complementary filament, exactly as it happens in the nucleic acids.

Both the fact that the formation of RNA happened spontaneously or that it substituted a simpler replica system, it is likely that one of the two was the reaction that allowed the further development of life.

A fundamental discovery, made by Thomas R. Cech, is that RNA can behave like an enzyme, being able to catalyse cuts and joins in its molecule. A further step forward is the demonstration, in the laboratory, of the natural selection of pre-biotic molecules.

This allows understanding in which way the ancient RNA genes interacted with protein molecules and how the genetic code could have evolved.

Furthermore, it is now accepted that the composition of the primordial atmosphere was not reducing and that the first macromolecules developed in hot ponds, probably originated by the presence of magma.

This supports the hypothesis of the presence of a weak magnetic field that could have favoured molecular coherence phenomena.

PS It is now in preparation an experiment, which will be carried out at Dr Celani's laboratory of the National Institute of Nuclear Physics – Italian National Laboratories of Frascati, for obtaining biological macromolecules, aimed to verify the hypothesis presented in this work.