



Ben-Gurion University of the Negev

The Jacques Loeb Centre for the History and Philosophy of the Life Sciences

A joint seminar with the Department of Chemistry

Did Too Many Cooks Spoil the (Prebiotic) Broth?

Antonio Lazcano, National Autonomous University of Mexico
(UNAM)

December 2nd (Monday), Building 51, Room 15, 15:00

The Jacques Loeb Centre seminars provide an interdisciplinary forum, in which historians and philosophers of science, as well as scientists, present and discuss new research related to science with a special focus on the life sciences. Case studies and surveys examine the impact of political, socio-economic and personal factors on the conduct of science, the ethics of research, and the causes of progress and setbacks.

Faculty and students from all disciplines are invited!

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Prof. Ute Deichmann, Director

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The heterotrophic origin of life, proposed by A. I. Oparin, J. B. S. Haldane and few others in the 1920's, was part of a Darwinian framework that assumed that living organisms were the historical outcome of a gradual transformation of lifeless matter. These views soon merged with the developments of biochemistry and cell biology, which transformed the discussion of the emergence of the first cells into a workable multidisciplinary research program. Although neither Oparin nor Haldane performed any experimental simulation of the primitive milieu, several important pieces of information supported their claims. This included, among others, the 19th-century classical experiments of Wöhler, Strecker, Butlerov, and Mendeleev, who had each independently demonstrated the feasibility of the laboratory synthesis of urea, alanine, sugars and hydrocarbons, respectively.

The possibility of a gradual, step-wise origin of life was strongly opposed by the geneticist H. J. Muller, who argued that single genes or DNA molecules represented primordial living systems. The debates that followed represented not only contrasting views of the nature of life itself, but also major ideological discussions that reached a surprising intensity in the years following the 1953 Miller-Urey experiment. This experiment demonstrated the ease with which organic compounds could be synthesized under putative primitive reducing conditions. Following the Miller-Urey experiment, attempts to understand the origin of life were shaped, to a considerable extent, by the development of molecular biology and, in socio-political terms, by the atmosphere created by Cold War tensions. Although, as late as 1942, the possibility that bacteria were endowed with genetic material was held in doubt, the molecularization of biology led several scientists, both in the USSR and in other European countries, to acknowledge the key role that RNA molecules play in major biological processes and to discuss the idea that RNA could have preceded DNA as genetic material. This possibility was discussed by Belozersky, Haldane, Oparin and Lipmann, and in retrospect, should be recognized as a pioneering attempt to put the developments in molecular biology within an evolutionary perspective. It was not until the late 1960s that the extraordinary intuition and deep understanding of RNA chemistry led Rich, Woese, Crick and Orgel to independent suggestions of what can be termed today the RNA World.

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