The age of the "synthetic" biology: Are biological systems also physical systems?

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Recent advances in the field of the synthetic biology has far reaching consequences for the philosophy of biology and revive the long standing debate of vitalism versus materialism in a modern context. Can we conceive cells, and biological systems in general, as mere machines that one may manipulate them like every other physical system? Can we synthesis life or invent even new forms of life without any precedent in nature? The answer of some people active in this field of research seems to be affirmative in the light of new advances in the synthetic biology. In this lecture I will first consider the general view of physicists on what is a physical system, which includes a long tradition starting from Newton and his analysis of the solar system and how this evolves through time. Also, the synthetic chemistry is considered from historical viewpoint and its role on the materialization of the concept of chemical system is scrutinized. Then, it will discussed that to what extent recent advances in synthetic biology make the biological systems physical/chemical systems and whether metaphors like "programmable machines", used to describe living systems, are legitimate description of biological systems. The idea of synthetic life will be considered and particularly the recent experimental advances made by Craig Venter and his associates will be in focus. In the end, the general perspective that the synthetic biology is delivering is examined with an eye to its philosophical implications.

Some general references:

1- Synthetic Biology: A Primer, written by Daisy Ginsberg, 2009.

2- Regenesis: How synthetic biology will reinvent nature and ourselves, written by George Church and Ed Regis, 2012.

3- Synthesizing life, J. W. Szostak, D. P. Bartel, P. L Luisi, Nature, 409, 387-390 (2001)

4- Synthetic Life, W. Gibbs, Scientific American, 290 (5), 74-81 (2004)

5- Engineering life: building a FAB for biology, D. Baker, G. Church, J. Collins, D. Endy, J. Jacobson, J. Keasling, P. Modrich, C. Smolke, R. Weiss, Scientific American, 294 (6), 44–51 (2006)