B·DEBATE International Center for Scientific Debate BARCELONA

upf. Universitat Pompeu Fabra Barcelona

ORKUN SOYER

CV

PARTICIPANT AT:

SYNTHETIC BIOLOGY. FROM STANDARD BIOLOGICAL PARTS TO ARTIFICIAL LIFE

September, 17th-18th, 2015, Barcelona

Orkun Soyer, Professor, University of Warwick, Coventry, UK

Soyer is currently leading an interdisciplinary research group in Systems and Synthetic Biology at the University of Warwick. He was born in 1975 in Istanbul and studied Chemistry at the Bogaziçi University. After receiving a PhD and at the University of Michigan, Ann Arbor, Soyer held a postdoctoral research position at the ETH, Zurich and independent group leader positions at Microsoft Research - University of Trento Computational Biology centre and University of Exeter. Soyer's research interest combine evolutionary biology with systems and synthetic approaches and employs both modeling and experimental tools. The ongoing research projects in his group focuses on understanding and engineering microbial communities, understanding metabolic basis of host-pathogen interactions, and modeling and engineering cellular signaling networks.

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ABSTRACT

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Evolutionary Design Principles for Synthetic Biology

The grounding rationale of synthetic biology is rooted in a strong desire to "engineer" biology through the use of engineering principles, however, it is not clear what these principles should cover in the context of biology. They are clearly expected to include those that are well-established in other engineering disciplines (e.g. computer-aided design, standardization, and modularity), but are also in need to expand to meet the challenges and potentials arising from the unique features of biological systems. Here, I will argue that any engineering attempts to biology should include an evolutionary perspective on design. The emergence of design in engineering and evolution display marking differences, with the evolutionary processes particularly prone to exploit inherent features and constraints of biological systems. In this talk, I will aim to demonstrate how evolutionary and engineering viewpoints could be combined to enrich designs in synthetic biology, and in turn, how evolutionarily motivated designs can provide insights onto biological function and evolutionary processes. The talk will be focused in two parts. On one hand, I will aim to illustrate how an evolutionary viewpoint can provide insights on which of multiple functionally-equivalent designs might be most amenable to implement in a given biological system. On the other, I will explore how functions that are not easily implemented (or imagined) under simplistic engineering viewpoints, can be implemented through designs that are understood from an evolutionary standpoint. These two parts are set in the context of example studies of cellular signaling networks and microbial communities respectively.

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