

Preface

In his enlightening *Letters to a Young Scientist* (2013) myrmecologist and sociobiologist Edward O. Wilson beautifully describes three different archetypes of the scientific mind. The creative life of a scientist could be oriented to a travel into unexplored regions (e.g., the detailed molecular cartography of a cell or the most remote galaxies), a fight against evil (e.g., the great health afflictions or the shortage in energy sources), and a kind of Grail Quest. Among the extraordinary search of a real grail Wilson proposes “the creation in the laboratory of a simple organism.” It is hard not to agree that this experiment could be the most intellectually shocking in human history: a second example of life in our hands.

As scientists involved in research and teaching in diverse areas of biology, such as biochemistry, genetics, or biotechnology, we are also engaged in the development of synthetic biology, a multifaceted approach to redesign living organisms. In particular, we have been involved in the development of several student projects for the international competition in synthetic biology iGEM, and have joined the debate on the nature life, its origin, and its possible synthesis in the laboratory. Actually, the origin of our adventure of writing this book started with a paper of ours entitled “Are we doing synthetic biology?”

We are witnessing thrilling times in biological sciences. There is no limit to gather all the information from a living system—through the so-called *omics* techniques—but we lack the appropriate theoretical and conceptual tools to turn data into understanding. We are on the verge of synthesizing an artificial cell, but as John B.S. Haldane did anticipate, will this occur before we have a full understanding of those tiny chemical devices we call living cells? Some authors have suggested that synthetic biology is the armed arm of systems biology. Some others advocate for the straightforward application of engineering principles to life. We are convinced that through the synthesis of cells we will capture some essential aspects of life, let alone the immense horizon of technological applications forecasted for redesigned cells.

In this book, we will discuss on life, engineering and life engineering, and how to go beyond the boundaries of nature. We will describe the historical evolution of synthetic biology; from the term itself to the state of the art of the discipline; we will

describe the complementary approaches to the ultimate goal of synthetic biologists: the creation of a truly artificial life form; we will make a focus on the iGEM competition; and finally, we will give an opinionated view on the boundaries of the discipline and its overlapping with other research fields, such as metabolic engineering.

Given the general interest in synthetic biology, but also the likely fear or euphoria associated with the possibility of an artificial production of life, we have worked on this book with the hope that scientists would find a non-biased guide to this emerging field, whereas an educated but non-specialist public may discover the clues to a better understanding of the actual scientific boundaries of synthetic biology.

Finally, we would like to recognize the help of several people and institutions in this work: Michel Morange and Ricard Solé, for kindly providing us with a Foreword and a Postface, respectively, with their authoritative perspectives from the present to the past and to the future; Fabiola Barraclough for expert proofreading of the manuscript. The financial support by Càtedra de Divulgació de la Ciència (University of València), Spanish Mineco (grant BFU2012-39816-C02-01), and Generalitat Valenciana (grant Prometeo 2009/092) is acknowledged. The Valencia-Biocampus iGEM team is supported by the University of València (Oficina de Polítiques d'Excel·lència) and the biotechnology company Biopolis SL. The work on this book has been supported in part by the European Union (grant ST-FLOW coordinated by Victor de Lorenzo).

Manuel Porcar
Juli Peretó

Synthetic Biology

From iGEM to the Artificial Cell

Porcar, M.; Peretó, J.

2014, XII, 77 p. 24 illus., 21 illus. in color., Softcover

ISBN: 978-94-017-9381-0