

Synthetic Biology of Antibiotic-Producing Bacteria for Drug Discovery and Development

Sergey B. Zotchev

Department of Biotechnology, Norwegian University of Science and Technology,
7491 Trondheim, Norway

Synthetic Biology is a relatively new discipline based on applying engineering principles to develop novel biological systems of industrial and medical importance. The tools and principles of Synthetic Biology can be applied to engineering virtually any living organism, but the complexity and diversity of some species represent major challenges. Actinomycete bacteria are attractive targets for synthetic biologists, since they produce a vast variety of biologically active compounds, some of which are used today as anti-microbial and anti-cancer drugs, immunosuppressants etc. Recent advances in genome sequencing revealed that genetic potential for production of bioactive compounds in actinomycetes is much larger than that revealed by conventional screening. Synthetic Biology-based approaches to harness biotechnological potential of actinomycetes, including activation of silent gene clusters, engineering of designer production host and novel regulatory circuits will be presented.