Directed evolution strategies for cellular and metabolic engineering

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The field of Metabolic Engineering has recently undergone a transformation that has led to a rapid expansion of the chemical palate of cells. Now, it is conceivable to produce nearly any organic molecule of interest using a cellular host—from biofuels to biopolymers to pharmaceuticals. However, these feats require the ability to “hijack” native cellular machinery and metabolism and navigate the complexity inherent in cellular regulation. One particularly useful and broadly applicable approach for reconfiguring and modulating cellular system is protein directed evolution. This talk will focus on illustrating the power of merging metabolic engineering approaches with protein engineering principles and synthetic biology for common metabolic engineering targets such as pathway enzymes, genetic control elements, transporter proteins, and both regulatory and epigenetic elements. Several case studies will be used to demonstrate these concepts. Finally, this talk will conclude with prospects for the future of cellular engineering.