Bacterial Solutions to Challenging Problems: New Approaches to Bioenergy, Bioremediation, and Biomanufacturing

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Microbes play a critical role in Nature due to their ability to produce and degrade a vast array of diverse chemicals. This powerful metabolic versatility holds great promise for biotechnology. To harness such potential requires multidisciplinary scientific knowledge and application. This seminar will describe a novel approach to adaptive laboratory evolution in which a soil bacterium can be engineered to broaden its natural catabolic activities. The method, Evolution by Amplification and Synthetic Biology (EASy), exploits the unique genetic system of a non-pathogenic soil bacterium, Acinetobacter baylyi ADP1. The long-term goal of the research is to reduce our dependence on fossil fuels by using renewable biomass as a feedstock and generating bacteria that can convert this material to valuable chemicals for use in biomanufacturing. Currently, the bioprocessing of lignocellulosic material focuses on converting cellulose to biofuels, while leaving lignin as a vastly underutilized resource. To make such biofuel production economically feasible, the EASy method is being used to facilitate the bacterial conversion of lignin to valuable compounds. Additional experimental efforts are developing bacteria that can degrade plastic waste.

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